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*Old Dominion University*

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A STUDY OF THE FACTORS THAT PREDICT  
ACADEMIC SUCCESS AND RETENTION OF STUDENT-ATHLETES

by

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A Dissertation Submitted to the Faculty of  
Old Dominion University in Partial Fulfillment of the  
Requirement for the Degree of

DOCTOR OF PHILOSOPHY  
HIGHER EDUCATION  
OLD DOMINION UNIVERSITY  
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## ABSTRACT

Institutions across the country and the National Collegiate Athletic Association (NCAA) are continuously looking for ways to improve the academic success and retention of students. Most research focuses on the use of cognitive factors as predictors; however, there has been an increase in the use of non-cognitive factors in this research. This study used logistical regression in the examination of non-cognitive, cognitive, and demographic factors as predictors of academic success and retention of Division I first-year student-athletes at a large, public, moderately selective, research extensive institution. The population consisted of 275 students who participated in 16 intercollegiate teams. The Transition to College Inventory provided non-cognitive data for each of the participants. The cognitive factors included high school GPA and SAT/ACT scores. The analysis also included the demographic variables of race, gender, socioeconomic status, and sport revenue status. The results indicate that the TCI Index, as well as self-confidence, institutional commitment and independent activity focus can assist in the prediction of academic success when used individually. However, high school GPA provides the best prediction. Retention is most accurately predicted by students' first year cumulative GPA. The results of this study show both similarities and differences with prior research, which indicates a need for further research related to the student-athlete population. Universities and the NCAA can use the results of this study to enhance the resources available to student-athletes designed to improve their academic performance and persistence.

## TABLE OF CONTENTS

ACKNOWLEDGEMENTS .....	ii
ABSTRACT .....	iii
LIST OF TABLES .....	vi
LIST OF FIGURES .....	viii
CHAPTER I. INTRODUCTION .....	1
Problem Statement .....	5
Purpose of the Study .....	5
Research Questions .....	6
Significance of the Study .....	7
Definition of Terms .....	8
CHAPTER II. REVIEW OF THE LITERATURE .....	11
Student-Athlete Population .....	11
Academic Progress Rate .....	18
Retention .....	21
Demographic Factors .....	24
Cognitive Factors .....	30
Non-cognitive Factors that Influence Academic Success and Retention ....	31
Factors Impacting the Academic Success of Student-Athletes .....	35
Factors Impacting Retention of Student-Athletes .....	36
Non-cognitive Assessment .....	38
Summary .....	41
CHAPTER III. METHODOLOGY.....	43
Sample .....	45
Instruments .....	46
Data Analysis .....	52
Limitations .....	54
CHAPTER IV. RESULTS .....	55
Summary .....	71
CHAPTER V. DISCUSSION .....	74
Introduction .....	74
Summary of Study .....	74
Summary of Findings and Conclusions .....	75
Implications .....	78

Limitations .....	82
Future Research .....	82
REFERENCES .....	84
APPENDIX A .....	95
APPENDIX B .....	105

**LIST OF TABLES**

1. Sports Offered at the Institution between 2003 and 2008	45
2. TCI Sections and Response Format	48
3. TCI Index Risk Level	49
4. Predictor and Criterion Variables	53
5. Summary of Demographics for Student-Athlete Population	57
6. Summary of Retention for Student-Athlete Population	59
7. Summary of Academic Standing after First Year for Student-Athlete Population	59
8. Student-Athlete Risk Group Distribution based on TCI Index	60
9. Student-Athlete Risk Group Distribution based on TCI Index for those not Retained	60
10. Student-Athlete Risk Group Distribution based on TCI Index for those not in Good Academic Standing	61
11. Comparison of Observed and Predicted Values for Academic Standing for Nine Factors of the TCI	63
12. Comparison of Observed and Predicted Values for Academic Standing for the TCI Index	64
13. Comparison of Observed and Predicted Values for Academic Standing for Demographic, Cognitive, and Non-cognitive (Nine Factors of the TCI) Variables	65
14. Comparison of Observed and Predicted Values for Academic Standing for Demographic, Cognitive, and Non-cognitive (TCI Index) Variables	67
15. Comparison of Observed and Predicted Values for Retention For Demographic, Cognitive, and Non-cognitive (Nine Factors of the TCI) Variables	69

16. Comparison of Observed and Predicted Values for Retention for Demographic, Cognitive, and Non-cognitive (TCI Index) Variables	70
17. Summary of Findings for Null Hypotheses	73



**LIST OF FIGURES**

1. The 2014 Inside Higher Ed Academic Performance Tournament	1
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# CHAPTER 1

## Introduction

The academic success and graduation of collegiate student-athletes is a hot topic across the country. Now, even Inside Higher Ed (Grasgreen, 2014) is getting into the action by publishing a March Madness bracket. However, the bracket looks quite different from that published annually in the press. This bracket's genesis is the National Collegiate Athletic Association's (NCAA) recently established Academic Progress Rate (APR) (see Figure 1).

Figure 1. The 2014 Inside Higher Ed Academic Performance Tournament.

Round of 64 March 20-21	Round of 32 March 22-23	Sweet Sixteen March 27-28	Elite Eight March 29-30	Final Four April 5	Championship April 7	Final Four April 5	Elite Eight March 29-30	Sweet Sixteen March 27-28	Round of 32 March 22-23	Round of 64 March 20-21
1 Florida 16 UA/Md/Mary 8 Colorado 9 Pittsbuigh 5 VCU 12 SP Austin 4 UCLA 13 Tulsa 6 Ohio State 11 Dayton 3 Syracuse 14 W Michigan 7 New Mexico 10 Stanford 2 Kansas 15 E Kentucky	1 Florida 8 Colorado 5 VCU 4 UCLA 11 Dayton 14 W Michigan 7 New Mexico 2 Kansas	1 Florida 5 VCU 11 Dayton 2 Kansas	1 Florida 2 Kansas	2 Kansas	<b>NATIONAL CHAMPION</b> Kansas	BVU 10	Gonzaga 8 Gonzaga 8 Baylor 6 BYU 10 BYU 10	Gonzaga 8 Oklahoma 5 Oklahoma 5 BYU 10 American 15	Weber State 16 Gonzaga 8 Oklahoma 5 NM State 13 Baylor 6 Creighton 3 Creighton 3 BYU 10 American 15	Arizona 1 Weber State 16 Gonzaga 8 Oklahoma St 9 Oklahoma 5 ND State 12 San Diego St 4 NM State 13 Baylor 6 Nebraska 11 Creighton 3 LA Lafayette 14 Oregon 7 BYU 10 Wisconsin 2 American 15
1 Virginia 16 Coastal Car 8 Memphis 9 S Wash 5 Cincinnati 12 Harvard 4 Michigan St 13 Delaware 6 UNC 11 Providence 3 Iowa State 14 NC Central 7 Connecticut 10 St Joe's 2 Villanova 15 Milwaukee	1 Virginia 8 Memphis 12 Harvard 4 Michigan St 6 UNC 3 Iowa State 10 St Joe's 2 Villanova	8 Memphis 4 Michigan St 6 UNC	8 Memphis 4 Michigan St 2 Villanova	8 Memphis	<b>Championship Game:</b> Arlington, TX	Texas 7	Louisville 4 Louisville 4 Texas 7	Kansas State 9 Louisville 4 NC St/Kanter 12 Louisville 4 Iowa/Tenn 11 Duke 3 Texas 7 Tulsa 7 Michigan 2	Wichita State 1 Cal Poly/Tx So 16 Kentucky 8 Kansas State 9 Saint Louis 5 NC St/Kanter 12 Louisville 4 Marquette 13 U Mass 6 Iowa/Tenn 11 Duke 3 Mercer 14 Texas 7 Arizona St 10 Michigan 2 Wofford 15	Wichita State 1 Cal Poly/Tx So 16 Kentucky 8 Kansas State 9 Saint Louis 5 NC St/Kanter 12 Louisville 4 Marquette 13 U Mass 6 Iowa/Tenn 11 Duke 3 Mercer 14 Texas 7 Arizona St 10 Michigan 2 Wofford 15

“The NCAA is committed to the quality education of student-athletes; it’s fundamental to our mission and values. That commitment is expressed through the efforts to improve student academic success, strengthen campus responsibility and increase overall accountability” (NCAA, 2007; NCAA Backgrounder). Based on this mission, the NCAA created APR guidelines, which measure the eligibility and retention of scholarship student-athletes at Division I institutions. Using the APR, Kansas would have been crowned the national champion in 2014 (Grasgreen, 2014).

Each student can earn a maximum of two points per semester; one point is earned if the student meets academic eligibility requirements and one point is received if the individual returns to the institution the following semester. An APR score is calculated for each team by totaling the points earned, dividing it by the total possible points, and then multiplying by 1000. The Division I Board of Directors agreed upon a minimum score of 925. Teams falling below this score receive an immediate or contemporaneous penalty, such as the inability to reissue an available scholarship after a student leaves the team. Teams that fall below a 900 receive historical penalties, which can include a reduction in scholarships or recruiting activity (NCAA, 2007, Defining Academic Reform).

The new APR guidelines have been initiated as one of many changes in academic reform for Division I NCAA member institutions. However, academic reform has been in existence for many years. The NCAA Presidents Commission, persuaded by the Knight Foundation Commission, approved several changes in academic requirements at the 1992 convention; the collective changes were called Proposition 16. As a result of these changes, entering student-athletes had to complete a minimum of 13 core courses in high

school. They also had to meet high school grade point average (HSGPA) and SAT/ACT scores based on a sliding scale. The last guideline established that year was the standards towards degree progress that requires student-athletes to complete 25% of the credit requirements for their degree by the end of their sophomore year, 50% by the end of their junior year, 75% by the end of their fourth year (Crowley, 2006). These standards were changed again in 2008, which included the completion of 16 core courses and an increase in the minimum percentage for degree completion to 40% after the sophomore year, 60% at the end of the junior year, and 80% after their fourth year (NCAA, 2007, NCAA Backgrounder).

The student-athlete population must meet these increased academic requirements while also balancing their athletic and other college activities. Student-athletes are required to participate in a maximum of 20 hours of athletic related responsibilities each week. They must also attend class, meet with tutors, and attend study hall hours (Holsendolph, 2006). Although this schedule is designed to enhance their athletic and academic success, these endeavors consume much of a student-athlete's daily life, leaving little time for personal activities.

Potuto and O'Hanlon (2006) found that student-athletes are more likely to identify as an athlete than as a student. These students may spend more time focusing on their athletic performance, hoping to play professionally if given the option, than they do on their academic success. However, student-athletes must maintain the academic requirements regulated by the NCAA in order to continue the opportunity to play their sport.

Research has shown that student-athletes arrive on college campuses less prepared than non-athletes, including lower standardized test scores and lower high school grade point averages (Maloney & McCormick, 1993). And, lower academic achievement in high school is likely to lead to lower academic performance in college (Maloney & McCormick, 1993; Purdy, Eitzen, & Hufnagel, 1982). This provides a challenge for athletic academic advisors who must counsel these students about how to achieve success in the classroom, especially with the focus on academic success given by the institution, the NCAA, and the media.

Demographic, cognitive, and non-cognitive variables have predictive ability for academic performance and retention of the general student population. Being African-American, male, and low socioeconomic status (SES) correlate with lower academic performance and rate of persistence compared to being Caucasian, female, and high SES (Allen, 1992; Astin, 1977; Leppel, 2002; Noble, 2003; Tinto, 1987; Walpole, 2003; Waugh & Micceri, 1994). Student-athletes who participate in revenue sports are less successful in the classroom and have a lower retention rate than those who participate in non-revenue sports (Kiger & Lorentzen, 1988; Maloney & McCormick, 1993). Both GPA and SAT/ACT predict academic success and retention (Boudreaux, 2004; Dennis, Phinney, & Chuateco, 2005; Larose & Roy, 1991; Lotkowski et al., 2004; Morgan, 2005; Scogin, 2007; Shivpuri, Schmitt, Oswald, & Kim, 2006). Non-cognitive factors that contribute to academic success include motivation, goals, study skills, and self-confidence level (Himmelstein, 1992; Kalna, 1986; Pritchard & Wilson, 2003).

Demographic and cognitive variables are routinely collected by institutions; however, non-cognitive data is commonly not collected or utilized to predict persistence

and graduation. One instrument that can be used to predict academic success and retention is the Transition to College Inventory (TCI) (Pickering and Calliotte, 1996). The instrument is administered to first year students prior to or during their first semester in college. Responses from 47 items on the survey comprise the TCI Index, which is used to identify students who may be academically at-risk. Advisors can use the TCI Index to help students improve their success academically, which may lead to increased academic performance and retention.

### **Problem Statement**

With the increased attention on NCAA collegiate athletes' eligibility and retention, more research needs to be conducted to determine the effectiveness of adding non-cognitive assessment tools when predicting college success and retention for Division I student-athletes. The TCI provides non-cognitive data which can be utilized to identify at-risk students together with cognitive and demographic factors gathered from the institution's student information system. The variables of race, gender, socioeconomic status (SES), sport revenue status, HSGPA, SAT/ACT scores, TCI Index, and the nine factors of the TCI were analyzed in this study to determine their ability to predict academic success and retention for collegiate student-athletes at a large, public, moderately selective, research extensive, Division I institution.

### **Purpose**

The purpose of this study was to examine the use of non-cognitive, cognitive, and demographic variables as predictors of academic success and retention of Division I first year student-athletes. Although there has been an increase in research related to the effectiveness of using non-cognitive variables to predict both academic success and

retention, many higher education institutions are still not utilizing these indicators to assist students; and neither is the NCAA. Cognitive factors, such as HSGPA and standardized test scores, are still the primary factors used by colleges and the NCAA to predict academic success. This study identifies the non-cognitive, cognitive, and demographic variables that best predict the academic success and retention of first year student-athletes at a large, public, moderately selective, research extensive, Division I institution.

### **Research Questions**

1. What non-cognitive variables, as measured by the nine factors of the Transition to College Inventory (TCI), predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
2. What non-cognitive variables, as measured by the TCI Index, predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
3. What combination of demographic, cognitive and non-cognitive variables (nine factors of the TCI) predicts academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
4. What combination of demographic, cognitive and non-cognitive variables (TCI Index) predicts academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
5. What non-cognitive variables, as measured by the nine factors of the TCI, predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?

6. What non-cognitive variables, as measured by the TCI Index, predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
7. What combination of demographic, cognitive and non-cognitive variables (nine factors of the TCI) predicts retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
8. What combination of demographic, cognitive and non-cognitive variables (TCI Index) predicts retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
9. Are there differences between the predictor variables for academic success when comparing the nine factors of the TCI and the TCI Index at a large, public, moderately selective, research extensive, Division I university?
10. Are there differences between the predictor variables for retention when comparing the nine factors of the TCI and the TCI Index at a large, public, moderately selective, research extensive, Division I university?

### **Significance of the Study**

The results of this study will provide information related to the factors that contribute to the academic success and retention of student-athletes. Use of this information can enhance the academic support services and, ultimately, the academic success of student-athletes. When combined with demographic variables, HSGPA, and standardized test scores, the criteria used for both institutional admittance and NCAA initial eligibility, the TCI data may readily identify those students who are academically



at-risk. Advisors can then intervene with at-risk students by using this information to enhance their academic performance and subsequent retention and graduation.

This study may be beneficial to all institutions within the NCAA. With the increased attention focused on the academic success and retention of student-athletes across the country, additional research is needed to identify variables that contribute to these outcomes. Non-cognitive factors have been found to correlate with both the academic success and retention of student-athletes (Cunningham, 1993; Garrett, 2000; Sedlacek & Adams-Gaston, 1992). Sedlacek and Adams-Gaston found that the non-cognitive factors correlated with a student's first-semester grades whereas the standardized test scores did not.

### **Definition of Terms**

Academic Difficulty:  $GPA < 2.00$

Academic Progress Rate (APR) Score: An APR score is calculated for each team by totaling the points earned, dividing it by the total possible points, and then multiplying by 1000. Each student can earn a maximum of two points per semester; one point is earned if the student meets academic eligibility requirements and one point is received if the individual returns to the institution the following semester.

Academic Success:  $GPA \geq 2.00$

Attrition: Term used to refer to students who do not continue classes or enroll for the subsequent fall term.

Contemporaneous Penalties: Penalties provided to teams who fall beneath the 925 cut-off APR score. If an ineligible student-athlete does not return to the team, his or her

scholarship cannot be reissued for one academic year.

**Division I:** Highest level of intercollegiate athletics in which institutions abide by NCAA membership requirements. This includes sponsoring at least 14 sports, with at least half for women. Each playing season has to be represented by each gender as well. There are contest and participant minimums for each sport, as well as scheduling and financial aid criteria.

**Eligibility:** Student-athlete status that qualifies them to play athletics according to NCAA guidelines.

**Historical Penalties:** Penalties given to teams who repeatedly fall below the 925 cut-off APR score. Penalties include reduction of scholarships, as well as recruiting, postseason competition, and membership restrictions. Penalties are based on a rolling four-year period.

**National Collegiate Athletic Association (NCAA):** Originally named the Intercollegiate Athletic Association of the United States, the NCAA began in 1906 as the organizing body that was created to address the issues that occurred due to the coexistence of athletics and academics. The NCAA became the enforcement agency almost 50 years later.

**Non-athlete:** A student enrolled in college who does not participate in collegiate sports sponsored by the NCAA.

**Non-Revenue sport:** A sport that does not charge admission, or the funds do not cover the sport's expenses.

**Recruited athlete:** A student-athlete who has been actively pursued by a coach and asked to attend the college that employs the coach and play for the team which he/she

coaches.

**Redshirt:** A student-athlete who does not compete during an academic year, whether due to injury, developmental period, or various other reasons.

**Retention:** Term used for students who persist and enroll for continuous semesters, measured fall to fall.

**Revenue sport:** A sport that charges admission and uses the money to cover the expenses of the sport.

**Socioeconomic status (SES):** The combined total income of the adult(s) with whom a student lived with during the previous year for the most recent tax year

**Student-athlete:** A student enrolled in college who participates in an NCAA sponsored sport.

**Transition to College Inventory (TCI):** A survey designed to identify non-cognitive factors that improve the predictive ability of cognitive and demographic factors for academic performance and retention

**TCI Index:** A compilation of 1-47 of the 115 items on the Transition to College Inventory that indicate the students risk of difficulty: the larger the score, the greater the risk

**Walk-on:** A student-athlete who was not recruited, and usually joins the team through a try-out process

## CHAPTER II

### Review of the Literature

Scholars have investigated many factors to determine these factors impact on a students' collegiate success. Different studies have found a relationship between demographic, cognitive, and non-cognitive variables and academic success. The present review of the literature examined all three types of variables and their predictive ability of academic success and retention for college students. Specific attention was given to the student-athlete population.

### Student-Athlete Population

#### Description

Student-athletes at Division I institutions are a unique population of students. Not only must these student-athletes accomplish the normal responsibilities expected of every other student on campus; they must also live up to the expectations of their coach, their team, and to the extensive NCAA rule book (Watt & Moore, 2001). They have many responsibilities that demand much of their time. Athletic requirements include practice and competition, weight lifting, travel to and from competitions, watching game film, and daily practices in-season (Hollis, 2001; Holsendolph, 2006). The NCAA regulates the number of hours a week a student-athlete can participate in athletic related activities. While the team is in-season, no more than 20 hours per week, with a maximum of four hours per day, can be spent on these activities. The student-athlete's schedule must also include one day off per week. Out-of-season, the maximum number of hours decreases to eight (NCAA, 2007). What is not regulated, however, is the required activity not

considered athletic-related, such as study halls, life skills programs, meetings with student support staff, and mandatory community service events. In addition, many student-athletes must spend time with athletic trainers for treatments of injuries. In other words, much of a student-athlete's time is structured.

### **Pursuit of Higher Education**

Rehberg and Schafer (1968) conducted a study in six high schools in Pennsylvania. Their findings indicated that a greater percentage of student-athletes, compared to non-athletes, planned to enroll in a college or university. "This relationship is especially marked among boys not otherwise disposed toward college, that is, those from working class homes, those in the lower half of their graduating class, and those with low parental encouragement to go to college" (p. 739).

Although a greater number of student-athletes plan to attend a higher education institution, not all student-athletes have similar academic and athletic goals. Mathes and Gurney (1985) conducted a study utilizing the Student-Athlete Recruitment Decision-Making Survey (SARDS). The student-athletes who completed the SARDS indicated a greater emphasis for "academics" and "coach" in selecting their chosen college, more important than "athletics" and "friends." Male athletes and those athletes on full scholarship rated athletics higher in the priority list than did female and partial scholarship athletes.

In contrast, 60% of the student-athletes surveyed by Potuto and O'Hanlon (2006) consider themselves more athlete than student. Some student-athletes, mainly basketball and football players, arrive on campus with the ambition to play professionally. However,

most student-athletes do not have the talent to play at the professional level (Gaston, 2002; Holsendolph, 2006).

In a study conducted by Blann (1985), first and second year male athletes were found to have less maturity than non-athletes, in the same academic class, for creating educational and career goals. However, by the time the student-athletes reached their third and fourth years, they had the same maturity level as non-athletes at the same level. Female athletes were found to be at similar maturity levels as their nonathletic female counterparts. Kennedy and Dimick (1987) also found an inconsistency between revenue and non-revenue producing sports. By administering the Career Maturity Inventory to all athletes at the selected institution and to a comparison group randomly selected from six undergraduate courses, they discovered that athletes in revenue sports had lower levels of career maturity than those in non-revenue sports.

Student-athletes face many challenges based on their athletic identity. It can be a struggle for them to form a sense of identity, whether they identify as *student* or *athlete* (Watt & Moore, 2001). At some institutions, they are isolated from other students because they live together in separate housing. They tend to be labeled early on, even in the classroom. Not only do many student-athletes dress alike and cluster together, they also are identified by their association with the athletic department. Typically professors are notified of any student-athletes in their courses in preparation for missed class time and other conflicts due to athletic competition (Adler & Adler, 1985; Walter & Smith, 1989; Watt & Moore, 2001). According to the study conducted by Potuto and O'Hanlon (2006), 49.2 % of the student-athletes surveyed felt they had been discriminated against by professors.

Engstrom (1991) found that students on college campuses possess negative attitudes toward student-athletes. Many have a difficult time believing a student-athlete has the ability to earn an A in a course. Students express concern about having a student-athlete as a partner in a lab course, and they dislike the additional services provided to student-athletes, such as tutoring and advising. Sedlacek and Adams-Gaston (1992) concluded that student-athletes resemble nontraditional students more than the traditional student population, and deal with many of the same issues as members of minority groups.

### **Academic Performance**

Many studies have found differences between the academic performance of student-athletes and non-athletes. Maloney and McCormick (1993) found that student-athletes had SAT scores that were approximately 150 points lower than non-athletes, and that non-athletes had a high school rank of 20 percentage points above student-athletes. The authors concluded that the combination of these two factors was the main reason for lower academic performance by student-athletes in college. They found that student-athletes scored a letter grade below non-athletes in three out of ten classes. Purdy et al. (1982) also found that student-athletes were not as academically prepared as non-athletes according to their “lower high school grade point average, high school class rank (percentile), SAT score, and ACT score” (p. 441).

In a study conducted by Melendez (2010), the impact of race, gender, and athletic identity on adjustment to college was examined for 101 Division I freshmen and sophomore student-athletes from three universities. Melendez used the Athletic Identity Measurement Scale, which consists of a 7-point Likert scale to determine the students’

level of athletic identity. The results of the study found modest inverse correlations between athletic identity and academic adjustment for Caucasian student-athletes; the higher the level of athletic identity, the more likely the student is to have difficulty with adjustment.

Student-athletes face all of the academic challenges faced by non-athletes plus many athletic requirements away from the classroom. They are put at a disadvantage when they are required to be absent from a class because of an athletic obligation, which may lead to missed tests and missed review sessions. Rhatigan (1984) found that basketball players missed 15-20% of their classes for away games. Athletic performance takes a lot of physical, as well as mental energy; many of the students do not get holiday breaks to rest and recuperate. The NCAA requires a minimum of full-time enrollment, as well as a minimum number of hours completed each semester, which prevents many student-athletes from dropping courses in which their performance is poor.

Many student-athletes struggle with balancing academics and athletics. Potuto and O'Hanlon (2006) reported that 65% of the student-athlete respondents to a survey thought their GPA was negatively impacted by athletic participation and would be elevated if they did not participate. Student-athletes tend to enter college with an idealistic view that they will be successful in college. However, this view eventually changes after they experience difficulties and disappointments during their first year. The fatigue and limited time to complete academic and athletic obligations gives way to conflict that negatively impacts their academic performance (Adler & Adler, 1985). Approximately 56% of Potuto and O'Hanlon's respondents said they often came to class without finishing readings and assignments, supporting Adler and Adler's findings.



The cognitive development of both females and males is impacted by participation in athletics during the first year of college. When compared to their nonathletic peers, female athletes, especially those who entered college with lower qualifications, showed significantly less development in reading comprehension (Pascarella & Bohr, 1995; Pascarella & Truckenmiller, 1999). Einarson and Matier (2002) also found that female athletes had lower mean rank-in-class than female non-athletes.

Males also fare worse academically when participating in athletics, but much of the research refers to the disparities of the males who are participating in revenue sports. Entering college football players were the least academically prepared (Purdy, Eitzen, & et al., 1982); however, Maloney and McCormick (1993) and Gurney and Stuart (1987) found that men's basketball players had the lowest collegiate grade point averages of all athletes. Together, Division I football and basketball players earned one-tenth of a grade point lower each semester than all other students. Overall, male athletes had lower GPAs than their male counterparts (Einarson & Matier, 2002).

When comparing statistics among or within all student-athletes, many differences exist. Kiger and Lorentzen (1988) investigated the impact of athletics on high school GPAs, college entrance exam scores, and academic probation data. They found that male athletes were more likely to be placed on academic probation than female athletes and minority athletes were twice as likely to experience probation as Caucasians. In general, athletes were more likely than non-athletes to be placed on academic probation (Kiger & Lorentzen, 1988).

Some research exists that demonstrates a positive impact between athletics and academics. Hood, Craig, and Ferguson (1992) examined the academic success of first year student-athletes compared to non-athletes at a Division I institution. Excluding football, athletes received similar grades as did their matched counterparts. Hood et al. concluded that the academic achievement of first year students who participated in varsity sports was not negatively impacted. Pascarella and Smart (1991) found that athletic participation had a “modest positive net effect on college academic achievement” (p. 128).

### **Graduation Rates of Student-Athletes**

The ultimate goal for any institution is to graduate its students. The NCAA is closely monitoring graduation rates, which means institutions must be concerned about student-athletes’ graduation rates even after they complete their eligibility (Holsendolph, 2006).

Adler and Adler (1985) conducted a four-year participant-observation study of a major college basketball program. They found that only 8% of the respondents had no aspiration for attaining a degree. Some of these students planned to participate as professionals within their sport, and their main concern was to stay eligible so that they could achieve this career goal. Similar results were discovered by Potuto and O’Hanlon (2006) who found that 92.5% of the student-athletes surveyed stated that it was very important to graduate from college. These studies indicate that student-athletes have the desire to earn a degree.

However, according to Einarson and Matier (2002), males who participated in athletics have lower aspirations to earn a degree than male non-athletes. Male athletes

were also less likely to aspire to earn a doctoral degree than their nonathletic peers. There was not a significant difference for female athletes compared to non-athletes regarding degree aspiration; however, there were distinct differences in degree attainment.

According to Einarson and Matier, females who participate in athletics graduate at rates higher than non-athletes; this is especially true for recruited female athletes. Male recruited athletes graduated at rates lower than non-athletes; however, male walk-on athletes graduated at higher rates than their non-athlete counterparts.

Race also serves to differentiate student rates of graduation. African-American male athletes graduate at rates higher than non-athlete, African-American males (Melendez, 2006). However, African-American athletes are more attracted to the idea of turning professional within their sport than Caucasian athletes. According to Snyder (1996), this means they are less motivated to earn a degree than Caucasian athletes.

Based on this review of the research literature, we can conclude that student-athletes are not as academically prepared as non-athletes when entering college, and they are less successful academically while in college. This provides administrators with the challenge of identifying those student-athletes who are in need of increased academic support in order to increase their likelihood of success in the classroom.

### **Academic Progress Rate**

#### **Eligibility**

Students entering Division I institutions with the intent of playing college athletics must first register with the NCAA Eligibility Center. The NCAA Eligibility Center certifies initial eligibility based on high school core courses, high school grade point average, and SAT/ACT scores. These standards have changed over the years, but

currently students must meet the requirements based on a sliding scale. A 2.0 grade point average can be accompanied by a 1010 SAT or 86 ACT and a 3.55 or higher GPA can have a minimum of a 400 SAT or 37 ACT. Beginning in the Fall 2008, 16 core high school courses were required, an increase from the previously required 14 (NCAA, 2007).

Once enrolled in a Division I college or university, student-athletes must make progress towards their intended degree, as well as meet minimum grade point averages. By the end of their second year, student-athletes must have earned 40% of their degree requirements in order to be eligible for participation in their sport the following year. This percent increases to 60% after their third year and 80% after the fourth year. The NCAA bases the percentage on a five-year clock, allowing students five years to complete four years of eligibility; in case of injuries and other types of redshirts. Student-athletes must maintain good academic standing with an annually increasing GPA requirement, and a minimum of six credit hours must be passed each semester (NCAA, 2007, NCAA Backgrounder).

### **Academic Reform**

The NCAA recently initiated academic-reforms that rely on data from the NCAA calculated Academic Progress Rate (APR) and the Graduation Success Rate (GSR) (NCAA, 2007, Defining Academic Reform). Prior to this reform, the NCAA evaluated an institution's academic success based on graduation rates of scholarship athletes within a six-year time frame. Under the new APR guidelines, each scholarship student-athlete at an institution can earn a maximum of two points per semester. One point is earned if the student-athlete meets academic eligibility requirements and one point is received if the

individual returns to the institution the following semester. An APR score is calculated for each team by totaling the points earned, dividing it by the total possible points, and then multiplying by 1000. The Division I Board of Directors agreed upon a minimum score of 925. If a team falls below this score it receives an immediate or contemporaneous penalty. Teams that fall below a 900 receive historical penalties (NCAA, 2007, Defining Academic Reform).

The GSR is a modification of the old graduation rate and is now used in addition to the required federal graduation rate. The new rate gives credit to institutions for transfer students, as long as they are eligible academically prior to switching institutions. Midyear enrollees are also accounted for in the GSR. Based on data collected by the NCAA, an APR score of 925 and 900 is equivalent to about a 60% and 45% GSR, respectively (NCAA, 2007, Defining Academic Reform). According to Hamilton (2005), eligibility and retention, the two components of the APR score, are the two most significant predictors of whether or not a student-athlete graduates from college.

In the past, retention was not as significant a concern as it is now with the new APR scores. Coaches are not going to be able to “run off” student-athletes who are not playing well because they may be penalized for a lower APR score. Teams will naturally lose points over time due to family issues and other circumstances that may cause a student to leave college, but coaches will have to be more cautious of factors that contribute to students’ departure when recruiting student-athletes to their institution.

Not only is the NCAA increasing academic standards for student-athletes, they are also publicizing institutional data that puts more attention on individual colleges and their teams. The individual colleges need the tools to identify their at-risk students in

order to provide the adequate resources to help prepare them for academic success and graduation.

### **Retention**

Retention has become an important topic for colleges and universities. In order to increase retention, institutions must first understand why students are leaving. Factors that influence a students' departure can be "generally categorized as cognitive (intellectual), non-cognitive (motivational), and environmental" (Hyatt, 2003, p. 261). Three contributors to the body of retention research are Alexander Astin, John Bean, and Vincent Tinto.

#### **Alexander Astin**

One of the most extensive studies related to retention was conducted by Astin in 1975. In a longitudinal study, he found that a student's high school grade average, rank in high school class, and college admissions test scores were significantly related to attrition. The most frequent responses given by students for attrition from college were boredom with courses, financial difficulties, dissatisfaction with requirements, and change in career goals. Men had a significantly higher response rate to items that indicated the reason for their departure was poor grades. One of the items on Astin's questionnaire asked students if there was a chance that they would drop out of college. Only 16% of those students who responded "no chance" actually dropped out. This rate doubled (33.5%) for those students who said there was a "very good" chance they would drop out.

Astin (1975) found that students who had poor grades were more likely to give the reason for dropping out as "being bored with their courses"; 23% of the respondents

who gave this reason had grades of C- or below. Twenty-eight percent of the students who gave the reason for dropping out as an “inability to take desired courses or programs” (p. 17) had grades of C- or below. In general, the higher the degree a student desired, the more likely they were to persist in college.

According to Astin (1975), first year students who are most likely to drop out are “those with poor academic records in high school, low aspirations, poor study habits, relatively uneducated parents, and small town backgrounds” (p. 45). Those students who turned in homework on time, did their homework at the same time every day, and made fewer careless mistakes on a test were more likely to remain in school. Additional responses that students gave for dropping out were boredom, difficulty in concentrating, studying with outside distractions, and not completing homework.

### **John Bean**

Bean (1980) examined student attrition with the use of a model for turnover in business organizations. He defined student attrition as “the cessation of individual student membership in an institution of higher education” (p. 157). This included transfers in the population with dropouts. The model takes into account satisfaction and institutional commitment, organizational determinants, and background variables. The background variables interact with the higher education environment. The interactions between the student and the institution can be measured in GPA, campus organizations, and value of the education. These interactions affect student satisfaction, which in turn affects institutional commitment. Ultimately, a student with higher levels of commitment would be less likely to dropout.

Bean examined questionnaires from 1,111 first semester students at a large Midwestern university. The results of the study presented two different models, one for males and one for females. The model for females describes institutional commitment as the factor contributing the most to retention. Other key factors are routinization, opportunity, university GPA, practical value, institutional quality, and satisfaction. Performance was the most significant background variable (Bean, 1980).

The model for men also includes institutional commitment as the factor contributing the most to retention. Additional variables related to male retention include satisfaction, routinization, development, and university GPA. As with the female model, performance contributed the most to attrition, “accounting for 25 percent of the variance in university GPA” (Bean, 1980, p. 178).

Bean (1982) conducted a follow-up study, which condensed his original model to 10 independent variables. The following variables are listed in descending order based on their influence on student attrition: intent to leave, grades, opportunity to transfer, practical value, certainty of choice, loyalty, family approval, courses, student goals, and major and job certainty.

### **Vincent Tinto**

Tinto’s (1993) Model of Institutional Departure consists of many different factors that influence a student’s departure from a higher educational institution. Initially, students enter college with various background characteristics, including family and community. They also have personal attributes, such as gender and race, as well as a range of intellectual and social skills. Prior educational experiences and achievements, financial resources, and motivations also contribute to their collegiate experience.



Students' background characteristics impact their intentions and goal and institutional commitments. External commitments are influenced by their social and academic interaction with others on campus. Affirmative interactions can positively impact a student's goals and commitments (Tinto, 1993).

The academic system as a whole can impact a student's decision to return to the institution. If a student feels that his or her educational experience is too easy, which may lead to boredom, he or she may choose to withdraw voluntarily. On the other hand, a student who finds academics too difficult may leave due to institutional dismissal (Tinto, 1993).

Retention is an important topic for institutions across the country. Astin, Bean, and Tinto all contributed to the research on retention. Although there are differences in each of these models, they all include background characteristics of students as a contributing factor to retention. The student-athlete population, although different in many aspects, bring those same background characteristics into college that can lead to early departure without effective intervention.

### **Demographic Factors that Influence Academic Success and Retention**

The demographic variables selected for this study were based on the model used by Dennis et al. (2005). These scholars identified the following background variables as having an effect on college student outcomes (GPA and commitment): race, socioeconomic status (SES), and gender. Dennis et al. also investigated sport revenue as a demographic variable that relates to the persistence and academic success of student-athletes.

## **Race**

Most studies that analyze race as it relates to persistence and academic success utilize three racial groups for their analysis: African-American, Caucasian, and Hispanic. Overall, researchers have found that Caucasians are more likely to experience success in the classroom, and are more likely to persist at higher rates than other racial groups (Tinto, 1993).

Noble (2003) conducted a study using the ACT Prediction Research file to review the academic performance of various racial groups. Noble found that African-Americans and Hispanics had lower ACT composite scores, high school GPAs, and lower mean first year GPAs than did Caucasians. When the ACT score and HSGPA were held constant for all three groups, African-Americans and Hispanics still had lower college GPAs than Caucasians. Waugh and Micceri (1994) also found that African-Americans earned lower HSGPAs and rate of graduation and retention when compared to Caucasians, Asians, and Hispanics.

Eimers and Pike (1997) conducted a study of 799 students who completed the Freshman Survey. The researchers grouped the students into two categories: minority and nonminority. Minorities were found to have both lower mean level pre-college ability (HSGPA = 2.53) and academic achievement (GPA = 2.70) than the nonminority students (HSGPA = 2.83 and GPA = 2.97 respectively). Minorities also had less external encouragement, academic integration, social integration, and institutional commitment than non-minorities. External encouragement refers to the support the students receive from family and friends (Bean, 1980). Eimers and Pike used Tinto's (1975) definition of academic integration combines the academic involvement and success of the students.

Social integration refers to the time students spend on the institution's campus, as well as the level of relationships with their peers. The final factor, institutional commitment, measures the level of importance the student places on obtaining a degree from the institution.

Overall persistence rates are lower for minorities when compared to non-minorities. Astin (1977) found the persistence rate was lower for African-Americans than Caucasians. Tinto (1987) also found that Caucasians were more likely to graduate than African-Americans and Hispanics. Tinto believes that race is not the only determining factor, but ability test scores and SES also play a role.

In a study conducted by Nettles, Thoeny, and Gosman (1986), several non-cognitive factors were compared among African-American and Caucasian students. "Student satisfaction, peer group relations, and interfering problems" were all better predictors of college GPA for African-American students than Caucasian students (p. 301). In addition, they found that African-American students had significantly lower SAT scores, high school GPAs, and socioeconomic status than Caucasian students. All of these factors contributed to lower college GPAs for African-American students.

Fischer (2007) found that family background was significantly different for different ethnic groups. For Caucasian and Hispanic students, first generation college student status correlated with lower grades. A positive impact on GPA was found for African-American students coming from a biological two-parent home.

### **Gender**

Astin (1977) found significant differences in persistence between men and women. Women were found to have higher grades at the college level, but had a lower

level of persistence. Although these differences still exist, the gender differences for persistence seem to be reversed in more recent years. This may be impacted by the increase in the number of women entering higher education (Tinto, 1987).

Leppel (2002) studied the difference in men and women's college persistence using the 1990 survey of Beginning Postsecondary Students, conducted by the National Center for Educational Statistics. The researcher conducted a logit analysis, based on 5,384 (50.8% women) student surveys, to determine factors that impacted persistence and academic success. Leppel found that predicted persistence was higher for females overall; however, the persistence rate was lower for African-American males than Caucasian males (0.9%). Caucasian men with a perceived above average academic ability had higher college GPAs; this is also true for Caucasian and Asian women.

DeBerard, Spielmans, and Julka (2004) conducted a longitudinal study to determine predictors of academic achievement and retention for college freshmen. Although their main focus was on psychosocial predictors, they found that gender was a significant predictor and was included in their multiple linear regression equation that accounted for 56% of the variance for first year cumulative GPA. Being a female correlated with higher GPAs than being male.

### **Socioeconomic Status**

Walpole (2003) conducted a study that analyzed the effects of socioeconomic status (SES) on college experiences and outcomes. SES included parental income, educational attainment, and occupational prestige. Approximately 2,400 students from each level (low and high) of SES were studied over a nine year period. Low SES students reported less time studying, less involvement in student activities, and lower GPAs.

Persistence is also positively correlated with economic background (Leppel, 2002; Allen, 1992; Astin, 1977; Tinto, 1993). Possibly due to the increased need to work, low SES students graduate at lower levels than high SES students (Walpole, 2003). Ishitani (2006) found that students from a family income of \$20,000 to \$34,999 were 72% more likely to drop out of college than were students from families with an income of \$50,000 or more.

In a study conducted by the ACT Office of Policy Research, SES was found to have a positive relationship to both college retention and college GPA. SES had a stronger correlation with retention than the ACT score, but not as strong as HSGPA. For both retention and college GPA, the strongest relationship was found when SES was combined with HSGPA, ACT, and select non-academic factors (Lotkowski, Robbins, & Noeth, 2004).

### **Sport Revenue Status**

Collegiate sports are generally classified into two groups: revenue and non-revenue. Revenue sports charge admissions for spectators and utilize the money generated through admissions and advertising to cover the expenses of the sport, usually supplemented by student fees and fundraising. Non-revenue sports are financially supported by student fees and fundraising. Basketball and football are both classified as revenue sports.

Student-athletes participating in revenue sports are less academically prepared for college and perform at a lower level once in college (Kiger & Lorentzen, 1988). Kiger and Lorentzen studied the impact of athletics on academic probation data. They found

that athletes participating in revenue sports were more likely to be on academic probation than those who participate in non-revenue sports.

Ervin, Saunders, Gillis, and Hogrebe (1985) conducted a study of football and basketball players enrolled in a developmental program at a Division I-A institution. They found that students with lower SAT scores required more developmental courses than those with SAT scores in the upper ranges. African-American student-athletes had lower SAT scores than their Caucasian counterparts and completed fewer academic courses while in high school, and enrolled in more developmental courses in college.

In a study conducted by Frantz (1967), athletes were matched with non-athletes on high school rank and college entrance exam scores. As a whole, athletes and non-athletes were approximately equivalent in GPA, major, socioeconomic status, and attrition rate; however, football players had lower GPAs and had higher attrition rates than other athletes. A significant difference was found between the composite ACT scores of football players (37.78) and other athletes (57.13).

Male football and basketball players are not achieving as well as male non-athletes in the areas of writing skills, reading comprehension, and critical thinking (Pascarella & Truckenmiller, 1999). This may be due partly to the coursework taken during the first year. The male revenue sport athletes tend to take more applied/preprofessional courses (i.e. physical education, speech pathology, family studies), which show very little correlation with an increase in reading comprehension (Pascarella & Bohr, 1995).

The demographic factors of race, gender, parental income, and sport revenue status all play a role in predicting the academic success and retention of collegiate

students. The use of these variables combined with other relevant factors can assist university administrators in identifying student-athletes at-risk of academic difficulty and provide them with necessary academic resources.

### **Cognitive Factors that Influence Academic Success and Retention**

Cognitive factors are the most common measurements for determining college admission. McCausland and Stewart (1974) found that a combination of high school grade point average and aptitude tests were the best determinants for college acceptance. As a part of many admissions processes, these factors are frequently studied as predictors of academic success and retention.

### **Academic Success**

High school GPA and American College Test (ACT) scores were found to be the top two cognitive variables correlating with a student's college GPA (Lotkowski et al., 2004). In 2006, Shivpuri et al. studied the college performance of 644 freshman undergraduate students at a large Midwestern university. Their results indicated that SAT/ACT scores were significant predictors of initial success in college; those with higher scores were more successful. In a study of high risk students, Larose and Roy (1991) found that high school grade point average was the best predictor of students' first semester performance. Dennis et al. (2005) also found similar results in their longitudinal study of minority students; high school GPA not only predicted cumulative college grade point average, but also college adjustment.

High school GPA and standardized tests have also been found to predict the academic success of the student-athlete population. Morgan (2005) and Scogin (2007) report that both high school GPA and the ACT composite score are statistically

significant predictors of student-athlete cumulative GPA in college. Both cognitive variables positively related to academic performance of basketball players in a study conducted in 10 southern universities (Reynolds, 2007). However, Maggard (2007) found that the ACT did not significantly correlate to first semester GPA for at-risk collegiate football players, although high school GPA did.

### **Retention**

Lotkowski et al. (2004) found that high school GPA and ACT scores both had a positive correlation with retention. High school GPA had the strongest relationship and ACT scores came in third behind socioeconomic status. Crouse and Trusheim (1998) also discovered that high school GPA was the better predictor of students earning a bachelor's degree, with a 73.4% accuracy rate. This is also supported by Boudreaux (2004) who added high school GPA as a variable in her predictive model of student-athlete retention.

The research reviewed here illustrates the importance of cognitive variables in predicting the academic success and retention of students. Although this study will analyze additional factors, it is a necessity to include cognitive variables as a part of a predictive model for both academic performance and retention of student-athletes.

### **Non-cognitive Factors that Influence Academic Success and Retention**

#### **Academic Success**

Non-cognitive variables are associated with adjustment, motivation, and perceptions; they are not quantitative variables typically measured by standardized tests. Non-cognitive variables are frequently used to analyze nontraditional students, although they can be used with all students (Sedlacek, 2004). Non-cognitive variables are better predictors of academic success and retention than cognitive variables; therefore, they can



be used to enhance the predictive ability of cognitive variables (Cunningham, 1993).

Some of the non-cognitive variables included in previous research include: positive self-concept, realistic self-appraisal, successfully navigating the system, preference for long term goals, availability of a strong support person, leadership experience, community involvement, and knowledge acquired in a field (Sedlacek, 2004).

Other studies have found that self-concept and self-appraisal predict academic success in collegiate students. Lounsbury, Huffstetler, Leong, and Gibson (2005) studied a student's sense of identity and the relationship it has with academic success. The authors found that sense of identity and emotional stability were positively correlated with collegiate GPA. Identity had a more significant relationship with academic performance for African American students. A study conducted by Tracey and Sedlacek (1985) also looked at predictors of academic success using the Noncognitive Questionnaire (NCQ). Positive self-concept and realistic self-appraisal were identified as predictors of a student's academic performance throughout his or her collegiate career. Pritchard and Wilson (2003) also found a significant relationship between a student's emotional health and his or her GPA. Another study found that remedial students were more likely to have lower scores on the Self Esteem Inventory than those who did not need to enroll in remedial courses students (Kinney & Miller, 1988).

Tracey and Sedlacek (1985) not only found self-concept and self-appraisal to be predictors of academic success, but that these variables also predicted preference for long-range goals in their longitudinal study at a large state university. Schmelzer, Schmelzer, Figler, and Brozo (1987) found that students identified a lack of goal setting

as a reason for failure, while successful students identified a reason for their success as setting challenging goals.

Motivation has also been reported as a predictor of academic success. Dunham (1973) found that achievement motivation increased the ability to predict college GPA when combined with high school GPA and gender. A longitudinal study of minority students was conducted by Dennis et al. (2005) to examine the relationship between motivation and college GPA. They found that career/personal motivation was a strong predictor of GPA and adjustment in college.

Several studies have analyzed the persistence and time management of students. Schmelzer et al. (1987) found that successful students identified persistence and active study as reasons for student success; and, poor time management a reason for students' failure. In a study of first semester students, McCausland and Stewart (1974) identified delay avoidance and work methods as factors that contributed to college success. These authors found that the more conscientious a student is, the higher his or her college GPA (Bauer & Liang, 2003; Lounsbury et al., 2005).

There are some conflicting results of the impact of personality factors on academic success. Lounsbury et. al. (2005) results indicated a positive correlation between extraversion and academic performance. However, Bauer and Liang's (2003) study of first year college students indicate that extraversion has a negative impact on GPA.

### **Retention**

Data from the ACT, Inc.'s Entering Student Survey (ESS) were analyzed by Kalna (1986) to help predict students who were at a high risk for attrition. The survey

was administered to all incoming students to evaluate level of risk based on student goal identification, commitment to motivation, person-environment interaction, academic ability and background, and study skills. At the end of the first term, Kalna determined that high risk students, as determined by the ESS, represented 85% of the students who left the university.

Himmelstein (1992) found similar results in his study at the community college level. Non-cognitive factors were included in the survey to identify students who were attrition-prone. The results indicated that students who responded negatively to certain items contained in the instrument used were more likely to depart from the institution. Some factors that are related to a student's attrition are fatigue and lower self-confidence (Pritchard & Wilson, 2003).

In a study conducted by Spady (1970), non-cognitive factors were found to play a role in male college attainment and goal fulfillment. Male success was influenced by their role in their high school peer groups and their involvement in extracurricular activities, especially athletics. The father's role in the community also impacted the son's goal attainment.

Non-cognitive variables are valid predictors of persistence and non-persistence for African-American, traditional age students. Tracey and Sedlacek (1985) developed the NCQ, which they used along with the SAT scores in their longitudinal study. They found that the persistence of African Americans was significantly related to academic self-confidence, realistic self-appraisal of academic skills, and academic familiarity. Additional factors included support for college plans and a preference for long range goals.

As this review of the related research indicates, non-cognitive factors are a good measurement of academic performance and retention for non-traditional students. Since student-athletes are often considered a non-traditional student population, it could be useful to use non-cognitive variables as predictive variables of academic success and retention for student-athletes.

### **Factors Impacting the Academic Success of Student-Athletes**

Sedlacek and Adams-Gaston (1992) found that the NCQ was correlated to first-semester grades of first-semester student-athletes; the SAT was not. Three non-cognitive variables that combined to predict first-semester grades were strong support person, community involvement, and positive self-concept. These same three variables were individual predictors along with realistic self-appraisal. These factors deal with confidence and support, which seem to be important for a student-athlete's success. On the other hand, Cunningham (1993) found that having too much self-confidence (top 10%) could have a negative effect on the academic success of student-athletes.

The NCQ was also used by Young and Sowa (1992) in their study of the academic success of African-American student-athletes. Non-cognitive factors were found to significantly correlate with college GPA and credits earned. Self-concept and long-term goals both correlated to semester and cumulative GPA. Class rank and knowledge acquired correlated to credits earned.

A student-athlete's perceived academic ability, as well as, long range goals, are valid predictors of academic success (Garrett, 2000). Student-athletes with "inadequate academic backgrounds, poor study habits, tight schedules, peer distractions, and waning motivation" often become frustrated, which contributes to lower grades in college (Adler

& Adler, 1985, p. 247). In a study using the Student Adaptation to College Questionnaire (SACQ), student-athletes reported higher academic adjustment scores when compared to their nonathletic peers. Melendez (2006) believed that this may be due to enhanced educational support programs, psychological support systems, mentor programs, and increased admissions requirements mandated by the NCAA.

Motivation is a significant non-cognitive predictor of student persistence/non-persistence. For student-athletes, it is important to assess motivation for both academics and athletics. Gaston (2002) found that male athletes were more motivated towards athletics than their female peers. Interestingly, low profile male athletes had the highest ACT scores, but the lowest motivation scores towards academics. In general, there was not a significant difference between high profile and low profile athletes. Female athletes were found to have higher academic motivation. In a study conducted by Willis (2005), a modified version of the Student Athletes Motivation toward Sports and Academics Questionnaire (SAMSAQ) was used to measure level of motivation. The results indicated that female basketball players showed no significant differences between their academic and athletic motivation. However, the study used a small sample from the Atlantic Coast Conference, which traditionally excels in both areas.

### **Factors Impacting Retention of Student-Athletes**

Although many factors have been found to be relevant for students who drop out, Cunningham (1993) found a difference between the variables affecting attrition in the general population and those correlated with attrition of student-athletes. Academic difficulty was an important factor for student-athletes. Factors that were not significant

for student-athletes were a college's faculty members, a college's academic reputation, and the success rate of the college's graduates for finding good jobs.

Rivera (2004) studied the key factors student-athletes believe are important in their decision to remain in school. 330 student-athletes at the Division I level completed the Understanding College Student-Athlete Retention questionnaire. She found that the most important factors were: timing of courses, variety of course offerings, institutional fit, academic performance, and ease of declaring a major. The least important factors were: involvement in special interest groups and extracurricular activities, academic support from teammates, informal student-faculty interactions, and individual athletic achievement. Those student-athletes, who had noted a prior intent to leave the institution, rated their athletic experience as more important; whereas, student-athletes without a prior intent to leave rated the quality of their academic experience as more important.

Astin (1975) found that greater than one-fourth of the non-returnees from the general student population reported financial difficulties as a reason for dropping out. Therefore, students who receive some type of financial aid may be more likely to persist. This may affect the student-athlete population, especially those who receive athletic scholarships. Although Potuto and O'Hanlon (2006) found that many student-athletes would participate in their sport regardless of scholarship money, they still believe it can help retain student-athletes.

Leppel (2005) found that female athletes were more likely than male athletes to persist at the institution where they first enrolled. Both male and female student-athletes, irrespective of division of institutional athletic membership, were more likely to be

retained from the first year to the sophomore year. However, males were also found to be more likely to change institutions than females due to their athletic participation.

Person and LeNoir (1997) found that student-athletes were “more likely to be retained in their degree program if they are involved in a summer program and work in study groups. They are also more inclined to persist when advising, research experiences, and career seminars are viewed as effective” (p. 86). Regardless of a student’s entering qualifications, Butler (1995) found that institutions with big-time football programs were more successful at retaining student-athletes due to their academic programs. Carr (1992) also found this to be true for African-American male athletes in highly supported basketball programs (as cited in Person & LeNoir, 1997). The programs reviewed consisted of an orientation, communication between instructors and coaches, ongoing academic progress review, and tutoring for the student in the athletic department. Institutions that provide intrusive support programs increase the retention of their student-athletes (Person & LeNoir, 1997).

### **Non-cognitive Assessment**

Many forms of assessment exist for traditional cognitive factors, but few in comparison are used to study non-cognitive factors that affect college academic success and retention. Non-cognitive variables traditionally include adjustment, motivation, and student perceptions (Sedlacek, 2004). Sedlacek states that aptitude tests are not good predictors for “anyone who has not had a White, middle-class, Euro-centric, heterosexual, male experience in the Unites States” (p. 6). For this reason, including the addition of non-cognitive instruments to GPA and HSGPA could result in an index with greater predictive value than the HSGPA and SAT/ACT scores alone.

Surveys are considered one of the best methods for attaining values and attitudes of students (Palomba & Banta, 1999). However, non-cognitive assessments rely on students' self-reports. This raises the question of validity. According to Pace (1985), self-reported data is found to be valid if the following three conditions are met:

1. Requested information is known to the student
2. The questions are clearly stated
3. The students believe the questions are worthy of a serious response

Vincent Tinto (1987) utilized self-report instruments to study retention. Tinto stated that non-cognitive assessments need to be student-centered and “collect information on the attributes, intentions, and activities of each student who enters the institution” (p. 214) to include both pre-college characteristics and the experiences while attending (academic and social). Institutions should begin collecting information prior to a student's first year in college in order to collect the most accurate data of pre-college characteristics, and continue at various intervals throughout the student's college career.

After more than 30 years of research, Sedlacek (2004) concluded that the currently available instruments for gathering student data were not providing adequate results for diverse racial and cultural groups. The results of the assessments did not typically correlate to student outcomes (grades or retention) and were not easily utilized by college administrators. As a result, Sedlacek developed the Noncognitive Questionnaire (NCQ) based on Sternberg's experiential and contextual domains. The eight variables included in the NCQ are: positive self-concept, realistic self-appraisal, successfully handling the system, preference for long-term goals, availability of strong



support person, leadership experience, community involvement, and knowledge acquired in a field.

After extensive research, Pickering and Calliotte developed the Transition to College Inventory (TCI), which was influenced by the works of Alexander Astin, Vincent Tinto, and William Sedlacek (Pickering et al., 2005). The TCI was created as an instrument that can improve the predictive ability of cognitive and demographic variables. Students are asked to self-report their pre-college characteristics and make predictions about their performance and involvement in college. The nine-factor model includes: college involvement, influences on college choice, student role commitment, athletic orientation, personal/academic concerns, self confidence, institutional commitment, socializing orientation, and independent activity focus. The TCI has been used to study not only students at the institution it was created for, but also piloted at other four-year institutions and community colleges (Freeze, 2000). It has also been modified to study both transfer students and student-athletes (Cunningham, 1993; Duggan, 2002).

Although there are multiple instruments for assessing non-cognitive predictors, the TCI has been identified as a valid predictive assessment for institutions (Banta, Lund, Black, & Oblander, 1996). When comparing the predictive ability of traditional cognitive variables with the non-cognitive variables in the TCI, the non-cognitive factors were more accurate in predicting the academic performance and retention during the first year of college (Cuseo, 2008). The TCI can be used to predict which students are at-risk and guide administrators in the treatment of these students early in a student's collegiate career (Pickering & Calliotte, 1996).

## Summary

With an increase in the attention given by the NCAA and the media especially related to the new APR scores, more scrutiny is now the norm for institutions faced with the challenge of retaining and graduating student-athletes. Student-athletes face many challenges while pursuing a college degree. Based on their many unique characteristics, some believe this population should be treated as nontraditional students, who are best assessed using non-cognitive variables.

Based on the research reviewed, there are numerous variables that predict the academic performance and retention of students during their first year in college. The demographic variables of race, gender, socioeconomic status, and sport revenue status, as well as the traditional cognitive variables of HSGPA and SAT/ACT have the ability to predict the success of collegiate students. The predictive ability of these variables can be combined with the non-cognitive assessment tool of the TCI to establish a model for the best predictors for the student-athlete population.

Several non-cognitive factors that predict the academic performance and retention of students include: self-concept, self-appraisal, motivation, institutional commitment, time management, long range goals, and persistence. This study specifically examined predictive factors identified in the TCI: college involvement, influences on college choice, student role commitment, athletic orientation, personal/academic concerns, self confidence, institutional commitment, socializing orientation, and independent activity focus.

There is limited research on the ability of non-cognitive factors to predict academic success and retention for student-athletes. Cunningham (1993) found the TCI to

be an effective tool for identifying at-risk student-athletes; however, the TCI was revised in 2003 (Pickering et al., 2005). This study utilized the current version of the TCI.

Many studies have been conducted to analyze the predictive ability of demographic, cognitive, and non-cognitive variables. A smaller number of studies have examined all these variables in combination, and only a limited number of studies have looked at these variables in relation to the student-athlete population. This study assessed the predictive ability of demographic, cognitive, and non-cognitive variables for the persistence and academic success of student-athletes at a large, public, moderately selective, research extensive, Division I university.

## CHAPTER III

### Methodology

This study examined the factors that effectively predict academic success of student-athletes at the end of their first year of enrollment and retention into the second year. Cognitive factors were analyzed including high school grade point average (HSGPA), standardized test scores (SAT/ACT), and college GPA (CGPA). Demographic variables included gender, race, SES, and revenue sport status. The Transition to College Inventory (TCI) (Pickering & Calliotte, 1996), which assesses pre-college characteristics, skills, and attitudes, was analyzed for its predictive ability of both academic success and retention. The analyses assessed the predictive ability of the TCI Index and each of its nine factors identified by an earlier factor analysis of the instrument. This chapter discusses the sample, the data collection, and the data analysis for this study.

The data was analyzed to answer the following questions:

1. What non-cognitive variables, as measured by the nine factors of the TCI, predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
2. What non-cognitive variables, as measured by the TCI Index, predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
3. What combination of demographic, cognitive and non-cognitive variables (nine factors of the TCI) predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?

4. What combination of demographic, cognitive and non-cognitive variables (TCI Index) predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
5. What non-cognitive variables, as measured by the nine factors of the TCI, predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
6. What non-cognitive variables, as measured by the TCI Index, predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
7. What combination of demographic, cognitive and non-cognitive variables (nine factors of the TCI) predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
8. What combination of demographic, cognitive and non-cognitive variables (TCI Index) predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
9. Are there differences between the predictor variables for academic success when comparing the nine factors of the TCI and the TCI Index at a large, public, moderately selective, research extensive, Division I university?
10. Are there differences between the predictor variables for retention when comparing the nine factors of the TCI and the TCI Index at a large, public, moderately selective, research extensive, Division I university?

### Sample

This study included data for those student-athletes whose first semester of enrollment at a large, public, moderately selective, research extensive, NCAA Division I university was between the years of 2006 and 2011. These years correspond with the most recent five years of the NCAA APR data collection. The student-athletes represent 16 sports (Table 1). The sports of football and rowing were excluded from this study since these sports were not added to this institution's program until 2008. The sport teams

Table 1

*Sports Offered at Institution between 2006 and 2011*

Men	Women
Baseball	Basketball
Basketball	Field Hockey
Golf	Golf
Sailing	Lacrosse
Soccer	Sailing
Swimming/Diving	Soccer
Tennis	Swimming/Diving
Wrestling	Tennis

were coded as revenue or non-revenue; Men's and Women's Basketball were considered revenue sports and the 14 other sports are non-revenue. International students were excluded since they are not required to complete the TCI. Students missing any data necessary for this study were also excluded.

### **Instruments**

Every first-year student enrolled at the study institution, excluding international students, is required to complete the TCI and the First-Year Biographical Questionnaire (BioQ) during the summer prior to their first fall semester of enrollment. Both surveys are web-based and administered by the Office on Institutional Research and Assessment (IRA). The TCI provided data on non-cognitive variables, which was analyzed separately using both the TCI Index and the nine TCI factors. The BioQ provided data for SES. The cognitive variables, as well as additional demographic variables, were gathered from the academic records in Banner, the University's student information system. This included HSGPA, SAT/ACT scores, CGPA, retention, race, gender, and sport revenue status.

The predictor variables include demographic, cognitive, and non-cognitive factors. The demographic variables include gender, race, SES, and sport revenue status. HSGPA, SAT/ACT score, and CGPA are included as cognitive variables, and the non-cognitive variables include the TCI Index and the nine factors of the TCI. The data for the predictor variables were gathered from the TCI, the BioQ, and Banner.

### **Transition to College Inventory**

The Transition to College Inventory (TCI) (Pickering et al., 2005) (Appendix A) is a survey designed to identify non-cognitive factors that improve the predictive ability of cognitive and demographic factors for academic performance and retention. The

instrument is a self-report of students' pre-college characteristics, attitudes and behaviors, as well as predictions of college performance and involvement. The TCI is administered before or at the start of the first year in college. The inventory is divided into seven sections (Table 2).

The TCI Index is a compilation of 1-47 of the 115 items on the survey (Pickering et al., 2005). The 47 items were identified as significant by comparing the responses of those students who completed the first semester in academic difficulty (GPA < 2.00) compared to those who were academically successful (GPA  $\geq$  2.00). When a student selects a response to an item that is part of the 47 identified items, his/her TCI Index increases by one; therefore, the TCI Index can range from 0 – 47. This index is used to identify students who may be academically at-risk, that is, possessing nine or more risk factors. Pickering et al. (2005) tested the validity of the instrument and found a significant difference in the responses between those students in academic difficulty and those who were not, a minimum of five to seven percentage points (M=3.8, SD=3.43). Additionally, a factor analysis on the correlations of all 115 items on the survey was conducted to identify nine factors. Based on a study of the 1998 entering class, a student's TCI Index indicates their risk level (Table 3).

In 2003, a factor analysis was conducted to identify the factors derived from the survey items that contributed to academic performance (Pickering et al., 2005). Items were loaded to the factors (eigenvalues of 0.40 and above) and those that did not successfully load on one of the factors and were not part of the TCI Index were deleted.



Table 2

*TCI Sections and Response Format*

Section	Number of Items	Response Format
Reasons for Attending College	10	Very Important Somewhat Important Not Important
Reasons for Choosing this College	20	Very Important Somewhat Important Not Important
Experiences During the Senior Year of High School	12	0 Hours 1-5 Hours 6-15 Hours 16-20 Hours Over 20 Hours
	7	Frequently Occasionally Never
Self Ratings of Abilities and Traits	15	Top 10% Above Average Average Below Average Lowest 10%
Attitudes About Being a College Student	12	Strongly Agree Moderately Agree Slightly Agree Slightly Disagree Moderately Disagree Strongly Disagree
Predictions About Academic Success at College	2	Multiple Choice
	18	Very Good Chance Some Chance No Chance
Predictions About Involvement in College	12	Never Occasionally Often Very Often
	7	Very Good Chance Some Chance No Chance
	1	First Choice Second Choice Third Choice Lower than Third Choice

(Pickering et al., 2005).

Table 3

*TCI Index Risk Level*

TCI Index	Risk Level	Academic Difficulty	Attrition Rate
0 – 5	Low	18%	20%
6 – 8	Above Average	33%	27%
9 +	High	42%	36%

(Pickering et al., 2005)

An exploratory factor analysis with principal axis method and varimax rotation identified a nine factor model. The nine factors are:

1. College involvement – Describes the extent to which students intend to actively participate in a variety of in- and out-of-class activities during college.
2. Influences on college choice - Describes how important a variety of external factors, people and college characteristics were in making the decision to enter this particular college.
3. Student role commitment - Describes the extent to which the student ascribes to behaviors and attitudes associated with being successful in college.
4. Athletic orientation - Describes the student's intention to devote a significant amount of time to organized sports and/or a personal exercise program while in college.
5. Personal/Academic concerns - Describes the extent to which the student

expresses a variety of personal and academic concerns that can interfere with their success in college.

6. Self confidence - Describes the student's level of confidence in a variety of academic and personal skills and abilities.
  7. Institutional commitment - Describes the extent to which the student is committed to attending and graduating from this particular institution.
  8. Socializing orientation - Describes the student's inclination to participate in social activities of the type and to the extent that they could negatively affect his/her academic performance.
  9. Independent activity focus - Describes the student's inclination to participate in activities and pastimes that do not involve active interaction with others.
- (Pickering et al., 2005, pp. 6)

A stepwise logistic regression was conducted to determine which factors significantly correlated to a student's academic performance at the end of the first semester. Five factors were considered significant predictors of academic difficulty: student role commitment (negatively correlated), athletic orientation (positively correlated), self confidence (negatively correlated), socializing orientation (positively correlated), and independent activity focus (positively correlated) (Pickering et al., 2005).

This study analyzed the predictive ability of the TCI Index and each of the nine factors for the academic success and retention of student-athletes.

### **First-Year Biographical Questionnaire**

The First-Year Biographical Questionnaire (BioQ) (Appendix B) is an institutional instrument used to gather background information on first-year students. All

students entering the institution are required to complete the 19-question survey during their first semester. This study used the BioQ to collect data on SES by analyzing the question, “What is your best estimate of the combined total income of the adult or adults with whom you lived during the past year for the most recent tax year?” Research indicates that both parental income and parents’ education are positive predictors of academic success, but only parental income was examined in this study.

### **Student Information System**

Banner is the student information system that was used to collect HSGPA, SAT/ACT score, CGPA, gender, and race for each of the student-athletes in the sample. The Office of Assessment provided the conversion of ACT composite scores to SAT scores. The sport revenue status was also gathered using the sport code in Banner. Those sports considered revenue-producing are men’s basketball and women’s basketball. The non-revenue sports are baseball, field hockey, men’s golf, women’s golf, women’s lacrosse, men’s sailing, women’s sailing, men’s soccer, women’s soccer, men’s swimming/diving, women’s swimming/diving, men’s tennis, women’s tennis, and wrestling.

The criterion variables for this study were student-athlete academic performance and retention into the second year, which are also part of the Banner data. Academic performance data is based on the student-athletes’ fall and spring semester GPA. A cumulative GPA of 2.0 or greater is considered academic success, and a GPA less than 2.0 is deemed academic difficulty. The GPA of 2.0 is a practical cut-off based on the university’s academic standing (good academic standing/academic warning).

Retention is based on a student-athlete's re-enrollment after the first year. A retained student is one who completes his/her first year and re-enrolls for the subsequent fall semester.

### **Data Analysis**

This study used a non-experimental, correlational design using purposive sampling and existing data records. The Statistical Package for the Social Sciences (SPSS) was used to analyze all data. Both criterion variables are dichotomous (academic success/academic difficulty and retained/not retained). The demographic variables (gender, race, and sport revenue status) were assigned dummy variables. Descriptive statistics provided information regarding the sample.

Research questions 1, 3-5, and 7-8 were analyzed using stepwise logistic regression (Table 4), while research questions 2 and 6 used logistic regression. Logistic regression is "well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables" (Peng, Lee, & Ingersoll, 2002, para. 4). In order to correct for nonlinearity and lack of normality between the predictor and dichotomous criterion variables, the natural logarithm of an odds ratio (logit) is computed for the criterion variable. Logistic regression predicts the logit of the criterion variable from the predictor variables (Peng et al.).

Stepwise logistic regression enters predictor variables in steps and a likelihood ratio is computed. The log likelihood of the reduced model is compared to the log likelihood ratio of the null model and the difference is called the model chi-square. The null model "reflects the net effect of all variables not in the model plus error" and the

Table 4

*Predictor and Criterion Variables*

Research Question	Predictor Variable(s)	Measured By	Criterion Variable
1	Nine Factors of TCI	TCI	Academic Performance
2	TCI Index	TCI	Academic Performance
3	Gender Race SES Sport Revenue Status HSGPA SAT/ACT Nine Factors of TCI	Banner Banner BioQ Banner Banner Banner TCI	Academic Performance
4	Gender Race SES Sport Revenue Status HSGPA SAT/ACT TCI Index	Banner Banner BioQ Banner Banner Banner TCI	Academic Performance
5	Nine Factors of TCI	TCI	Retention
6	TCI Index	TCI	Retention
7	Gender Race SES Sport Revenue Status HSGPA SAT/ACT CGPA Nine Factors of TCI	Banner Banner BioQ Banner Banner Banner Banner TCI	Retention
8	Gender Race SES Sport Revenue Status HSGPA SAT/ACT CGPA TCI Index	Banner Banner BioQ Banner Banner Banner Banner TCI	Retention

fitted model includes the predictor variables (Garson, 2009, para. 11). “The logistic equation is the linear combination of predictor variables which maximizes the log likelihood that the dependent variable equals the predicted value. The difference in the -2 log likelihood (-2LL) measures how much the final model improves over the null model” (Garson, 2009, para. 11). The null hypothesis is rejected when the probability ( $p$ ) is less than or equal to .05; therefore, the reduced model is found to be significant.

A logical comparison between the predictive models produced from research questions 1 - 4 was performed to determine the best predictive model for student-athlete academic performance (research question 9). The same process was completed for research question 10, comparing the predictive models from research questions 5 - 8.

### **Limitations**

This study was conducted at one large, public, moderately selective, research extensive, NCAA Division I university. This limits the ability to generalize the results to other institutions. The TCI instrument collects data that is self-reported by the students, which can lead to questions about the credibility of the responses.

## CHAPTER IV

### Results

The purpose of this study was to examine the use of non-cognitive, cognitive, and demographic variables as predictors of college success and retention of Division I first year student-athletes. The statistical package IBM SPSS Statistics 21 (IBM, 2012) was used to perform logistical regression on the following research questions:

1. What non-cognitive variables, as measured by the nine factors of the TCI, predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
2. What non-cognitive variables, as measured by the TCI Index, predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
3. What combination of demographic, cognitive and non-cognitive variables (nine factors of the TCI) predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
4. What combination of demographic, cognitive and non-cognitive variables (TCI Index) predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?
5. What non-cognitive variables, as measured by the nine factors of the TCI, predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?



6. What non-cognitive variables, as measured by the TCI Index, predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
7. What combination of demographic, cognitive and non-cognitive variables (nine factors of the TCI) predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
8. What combination of demographic, cognitive and non-cognitive variables (TCI Index) predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?
9. Are there differences between the predictor variables for academic success when comparing the nine factors of the TCI and the TCI Index at a large, public, moderately selective, research extensive, Division I university?
10. Are there differences between the predictor variables for retention when comparing the nine factors of the TCI and the TCI Index at a large, public, moderately selective, research extensive, Division I university?

### **Sample**

Data were collected from 428 student-athletes from 16 varsity sports. Logistic regression requires all variables to be present; therefore, cases were removed if any variable was missing. The final analyses were conducted with 275 cases. Data were collected from the following sports: baseball, men's basketball, men's golf, men's sailing, men's soccer, men's swimming, men's tennis, wrestling, women's basketball, field hockey, women's golf, women's lacrosse, women's sailing, women's soccer, women's swimming, and women's tennis.

The demographic characteristics are presented in Table 5. Of the 275 participants, 45.5% were male and 54.5% were female. The majority (81.1%) of the participants were Caucasian and 18.9% were minority. The average parental income of the participants was between \$40,000 and \$50,000. Some of the teams have low representation in this study, which is due to the small number of student-athletes recruited to the roster each year, in addition to the removal of international students from the study.

Table 5

*Summary of Demographics for Student-Athlete Population*

Variable	Frequency	Percent
Gender		
Male	125	45.5%
Female	150	54.5%
Race		
Caucasian	223	81.1%
African-American	25	9.1%
Other	27	9.8%
Sport		
Men's Baseball	21	7.6%
Men's Basketball	2	0.7%
Men's Golf	6	2.2%
Men's Sailing	13	4.7%

*(table continues)*

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Variable	Frequency	Percent
Men's Soccer	17	6.2%
Men's Swimming	34	12.4%
Men's Tennis	4	1.5%
Men's Wrestling	26	9.5%
Women's Basketball	8	2.9%
Women's Field Hockey	18	6.5%
Women's Golf	3	1.1%
Women's Lacrosse	38	13.8%
Women's Sailing	19	6.9%
Women's Soccer	27	9.8%
Women's Swimming	38	13.8%
Women's Tennis	1	0.4%
Sport Revenue Status		
Revenue Producing	10	3.6%
Non-Revenue Producing	265	96.4%

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The majority of the student-athletes (69.1%) in this study were retained from their first year to their second year (Table 6). Of those students not retained, 87.1% were Caucasian and 52.9% were male. The non-retained students had an average HSGPA of 3.33 and an average test score of 1080. In addition, a greater percentage (89.8%) of the

student-athletes were found to be in good academic standing after their first year (Table 7). The majority of the students not in good academic standing were Caucasian (85.7%) and male (67.9%) with an average HSGPA of 2.93 and an average test score of 1066. The distribution of the student-athletes' risk group based on the TCI Index is presented in Table 8. Table 9 and Table 10 present the distribution of risk group for those students not retained and those students not in good academic standing after their first year, respectively.

Table 6

*Summary of Retention for Student-Athlete Population*

	Frequency	Percentage
Not Retained	85	30.9%
Retained	190	69.1%

Table 7

*Summary of Academic Standing after First Year for Student-Athlete Population*

	Frequency	Percentage
Difficulty	28	10.2%
Good	247	89.8%

Table 8

*Student-Athlete Risk Group Distribution based on TCI Index*

TCI Index	Risk Level	Frequency	Percentage
0 – 5	Low	162	59%
6 – 8	Above Average	77	28%
9 +	High	36	13%

Table 9

*Student-Athlete Risk Group Distribution based on TCI Index for those not Retained*

TCI Index	Risk Level	Frequency	Percentage
0 – 5	Low	50	59%
6 – 8	Above Average	22	26%
9 +	High	13	15%

**Data Analysis**

This study utilized logistic regression to analyze the predictive ability of multiple independent variables. This method is used when only two categories of dependent

Table 10

*Student-Athlete Risk Group Distribution based on TCI Index for those not in Good Academic Standing*

TCI Index	Risk Level	Frequency	Percentage
0 – 5	Low	11	39%
6 – 8	Above Average	8	29%
9 +	High	9	32%

variables are included, in this case either good academic standing or academic difficulty and retained or not retained. Each of the predictors were added to the equation in order to find the best fitting model, chi square is reported to indicate the goodness of fit.

Nagelkerke  $R^2$  is also reported, which is a more reliable Pseudo  $R^2$ , and indicated the strength of the relationship between the predictors and prediction.  $EXP(B)$ , the odds ratio, provides that predictive ability as each of the predictors increases by 1 unit (Chapter 24: Logistic Regression, n.d.).

The following is a summary of the logistical regression for research questions 1 through 8. Statistical significance was set at  $p < .05$ . Research questions 9 and 10 will be based on a logical comparison of the predictive models from research questions 1 - 4, and 5 - 8, respectively.

Research Question 1: What non-cognitive variables, as measured by the nine factors of the TCI, predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?

*Null Hypothesis 1: There will be no statistically significant differences in the prediction of academic success for student-athletes based on the nine factors of the TCI.*

The nine factors of the TCI were entered into a stepwise logistic regression to predict the academic success of student-athletes. Three predictors (self-confidence, institutional commitment, independent activity focus) were found to be statistically significant, indicating that the combination of predictors reliably distinguished between those who succeeded and those who did not ( $\chi^2 = 24.193, p < .000$  with  $df = 3$ ).

Nagelkerke's  $R^2$  of .175 indicates that although the three predictors were significant, they are weak predictors of academic success for student-athletes. The Wald criterion indicated that self-confidence (Wald = 9.332,  $p = .002$ ), institutional commitment (Wald = 5.856,  $p = .016$ ), and independent activity focus (Wald = 5.372,  $p = .020$ ) made a significant contribution to the prediction. EXP( $B$ ) value indicates that when self-confidence, institutional commitment, and independent activity focus are raised by one unit the odds ratio is .916, 1.080, and .944 times as large, respectively.

The classification table (Table 11) demonstrates the overall prediction was 89.5% successful (98.8% for good academic standing and 7.1% for academic difficulty). The null hypothesis is rejected. Although self-confidence, institutional commitment, and independent activity focus were found to be statistically significant, it does not provide the practical significance for practitioners in predicting academic difficulty.

Table 11

*Comparison of Observed and Predicted Values for Academic Standing for Nine Factors of the TCI*

Observed		Predicted		
		Academic Standing After First Year		
		Difficulty	Good	Percentage Correct
Academic Standing	Difficulty	2	26	7.1
After First Year	Good	3	244	98.8
Overall Percentage				89.5

Research Question 2: What non-cognitive variables, as measured by the TCI Index, predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?

*Null Hypothesis 2: There will be no statistically significant difference in the prediction of academic success for student-athletes based on the TCI Index.*

A logistic regression was conducted to determine the predictive ability of the TCI Index on student-athlete academic success. The TCI Index was found to be statistically significant, indicating that it reliably distinguished between those who succeeded and those who did not ( $\chi^2 = 20.688, p < .000$  with  $df = 1$ ). Nagelkerke's  $R^2$  of .150 indicates that although the TCI Index was significant, it is a weak predictor of academic success for student-athletes. The Wald criterion indicated that the TCI Index made a significant contribution to the prediction (Wald = 19.461,  $p = .000$ ). EXP( $B$ ) value indicates that when the TCI Index is raised by one unit the odds ratio is .785 times as large.



The classification table (Table 12) shows the overall prediction was 89.8% successful (99.6% for good academic standing and 3.6% for academic difficulty). Therefore, the null hypothesis is rejected.

Table 12

*Comparison of Observed and Predicted Values for Academic Standing for the TCI Index*

Observed		Predicted		
		Academic Standing After First Year		
		Difficulty	Good	Percentage Correct
Academic Standing	Difficulty	1	27	3.6
After First Year	Good	1	246	99.6
Overall Percentage				89.8

Research Question 3: What combination of demographic, cognitive and non-cognitive variables (nine factors of the TCI) predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?

*Null Hypothesis 3: There will be no statistically significant differences in the prediction of academic success for student-athletes based on demographic, cognitive and non-cognitive variables (nine factors of the TCI).*

The nine factors of the TCI, along with the demographic and cognitive variables, were entered into a stepwise logistic regression to predict the academic success of student-athletes. Only one predictor, HSGPA, was found to be statistically significant ( $\chi^2$

= 23.050,  $p < .000$  with  $df = 1$ ). Nagelkerke's  $R^2$  of .235 indicates that although HSGPA is significant, it is a weak predictor of academic success for student-athletes. The Wald criterion indicated that HSGPA (Wald = 16.208,  $p < .000$ ) made a significant contribution to the prediction.  $EXP(B)$  value indicates that when HSGPA is raised by one unit the odds ratio is 18.591 times as large.

The classification table (Table 13) shows the overall prediction was 90.9% successful (99.5% for good academic standing and 0.0% for academic difficulty). The null hypothesis is rejected.

Table 13

*Comparison of Observed and Predicted Values for Academic Standing for Demographic, Cognitive, and Non-Cognitive (Nine Factors of the TCI) Variables*

Observed		Predicted		
		Academic Standing After First Year		
		Difficulty	Good	Percentage Correct
Academic Standing	Difficulty	0	18	0.0
After First Year	Good	1	190	99.5
Overall Percentage				90.9

Research Question 4: What combination of demographic, cognitive and non-cognitive variables (TCI Index) predict academic success for student-athletes at a large, public, moderately selective, research extensive, Division I university?

*Null Hypothesis 4: There will be no statistically significant differences in the prediction of academic success for student-athletes based on demographic, cognitive and non-cognitive variables (TCI Index).*

The demographic and cognitive factors, along with the TCI Index were entered into a stepwise logistic regression to predict the academic success of student-athletes. HSGPA was found to be statistically significant ( $\chi^2 = 23.050$ ,  $p < .000$  with  $df = 1$ ). Nagelkerke's  $R^2$  of .235 indicates that although HSGPA is significant, it is a weak predictor of academic success for student-athletes. The Wald criterion indicated that HSGPA (Wald = 16.208,  $p < .000$ ) made a significant contribution to the prediction. EXP(B) value indicates that when HSGPA is raised by one unit the odds ratio is 18.591 times as large.

The classification table (Table 14) demonstrates the overall prediction was 90.9% successful (99.5% for good academic standing and 0.0% for academic difficulty). The results support the rejection of the null hypothesis.

Research Question 5: What non-cognitive variables, as measured by the nine factors of the TCI, predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?

*Null Hypothesis 5: There will be no statistically significant differences in the prediction of retention for student-athletes based on the nine factors of the TCI.*

The nine factors of the TCI were entered into a stepwise logistic regression to predict the retention of student-athletes. The results do not support the predictive ability of any combination of the nine factors of the TCI on the retention of student-athletes,

Table 14

*Comparison of Observed and Predicted Values for Academic Standing for Demographic, Cognitive, and Non-cognitive (TCI Index) Variables*

Observed		Predicted		
		Academic Standing After First Year		
		Difficulty	Good	Percentage Correct
Academic Standing	Difficulty	0	18	0.0
After First Year	Good	1	190	99.5
Overall Percentage				90.9

college involvement ( $x^2 = .812, p > .05$ ), influences on college choice ( $x^2 = 1.338, p > .05$ ), student role commitment ( $x^2 = .000, p > .05$ ), athletic orientation ( $x^2 = .396, p > .05$ ), personal/academic concerns ( $x^2 = .006, p > .05$ ), self-confidence ( $x^2 = 1.976, p > .05$ ), institutional commitment ( $x^2 = 2.264, p > .05$ ), socializing orientation ( $x^2 = 1.118, p > .05$ ), independent activity focus ( $x^2 = 2.325, p > .05$ ). Therefore, it failed to reject the null hypothesis.

Research Question 6: What non-cognitive variables, as measured by the TCI Index, predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?

*Null Hypothesis 6: There will be no statistically significant differences in the prediction of retention for student-athletes based on the TCI Index.*

The TCI Index was entered into a logistic regression and results do not support its predictive ability for retention ( $\chi^2 = 2.640$ ,  $p = .104$  with  $df = 1$ ). It failed to reject the null hypothesis.

Research Question 7: What combination of demographic, cognitive and non-cognitive variables (nine factors of the TCI) predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?

*Null Hypothesis 7: There will be no statistically significant differences in the prediction of retention for student-athletes based on demographic, cognitive and non-cognitive variables (nine factors of the TCI).*

The nine factors of the TCI, along with the demographic and cognitive variables, were entered into a stepwise logistic regression to predict the retention of student-athletes. The cumulative GPA after the first year was found to be statistically significant, indicating that it reliably distinguished between those who were retained from the first year to the second year and those who were not ( $\chi^2 = 6.794$ ,  $p = .009$  with  $df = 1$ ). Nagelkerke's  $R^2$  of .060 indicates that although the cumulative GPA is significant, it is a weak predictor of academic success for student-athletes. The Wald criterion indicated that cumulative GPA (Wald = 6.99,  $p = .008$ ) made a significant contribution to the prediction.  $EXP(B)$  value indicates that when cumulative GPA is raised by one unit the odds ratio is 1.993 times as large.

The classification table (Table 15) demonstrates the overall prediction was 87.6% successful (100% for retained and 3.7% for not retained). The results support the rejection of the null hypothesis.

Table 15

*Comparison of Observed and Predicted Values for Retention for Demographic, Cognitive, and Non-cognitive (Nine Factors of the TCI) Variables*

Observed		Predicted		
		Retention		
		Not Retained	Retained	Percentage Correct
Retention	Not Retained	1	26	3.7
	Retained	0	182	100.0
Overall Percentage				87.6

Research Question 8: What combination of demographic, cognitive and non-cognitive variables (TCI Index) predict retention for student-athletes at a large, public, moderately selective, research extensive, Division I university?

*Null Hypothesis 8: There will be no statistically significant differences in the prediction of retention for student-athletes based on demographic, cognitive and non-cognitive variables (TCI Index).*

The TCI Index, along with the demographic and cognitive variables, were entered into a stepwise logistic regression to determine their predictive ability for retention of student-athletes. The cumulative GPA after the first year was found to be statistically significant, indicating that it reliably distinguished between those who were retained from the first year to the second year and those who were not ( $\chi^2 = 6.794, p = .009$  with  $df = 1$ ). Nagelkerke's  $R^2$  of .060 indicates that although the cumulative GPA is significant, it is a weak predictor of academic success for student-athletes. The Wald criterion indicated

that cumulative GPA (Wald = 6.99,  $p = .008$ ) made a significant contribution to the prediction. EXP( $B$ ) value indicates that when cumulative GPA is raised by one unit the odds ratio is 1.993 times as large.

The classification table (Table 16) shows the overall prediction was 87.6% successful (100% for retained and 3.7% for not retained). The data supports the rejection of the null hypothesis.

Table 16

*Comparison of Observed and Predicted Values for Retention for Demographic, Cognitive, and Non-cognitive (TCI Index) Variables*

Observed		Predicted		
		Retention		
		Not Retained	Retained	Percentage Correct
Retention	Not Retained	1	26	3.7
	Retained	0	182	100.0
Overall Percentage				87.6

Research Question 9: Are there differences between the predictor variables for academic success when comparing the nine factors of the TCI and the TCI Index at a large, public, moderately selective, research extensive, Division I university?

A comparison of the results of Research Questions 1 - 4 reveals that HSGPA is a predictor of academic success when either the nine factors of the TCI or the TCI Index are entered into the analysis along with demographic and cognitive factors. When

analyzing the nine factors of the TCI by themselves, self-confidence, institutional commitment, and independent activity focus were also significant predictors. Additionally, the TCI Index was a significant predictor when analyzed separately.

Research Question 10: Are there differences between the predictor variables for retention when comparing the nine factors of the TCI and the TCI Index at a large, public, moderately selective, research extensive, Division I university?

The results for Research Question 5 - 8 were compared and both supported the predictive ability of cumulative GPA after the first year.

### **Summary**

The purpose of this study was to examine the use of non-cognitive, cognitive, and demographic variables as predictors of college success and retention of Division I first year student-athletes. Logistic regression was used in 8 of the 10 analyses, with stepwise logistic regression used in six of those. The final two research questions were analyzed using logical comparison. Table 17 provides a summary of the findings.

In the analysis of the academic success of student-athletes, all four null hypotheses were rejected and three different models were found to significantly predict the outcome. When the nine factors of the TCI were entered, three factors were significant predictors of academic success: self-confidence, institutional commitment, and independent activity focus. The analysis of the predictive ability of the TCI Index for academic success revealed that it was a significant predictor. When demographic and cognitive predictors were added to the model, high school GPA was a significant predictor in both the model with the nine factors of the TCI and the TCI Index.



In the analysis of the models for retention of student-athletes from their first year to their second year, only two models were found to be significant predictors. Neither the nine factors of the TCI nor the TCI Index provided any predictive ability for first to second year retention. When the demographic and cognitive variables were added to the models, only cumulative GPA after the students' first year was found to significantly predict retention.

For each of the models that were statistically significant predictors, a high percentage of the students' academic success and retention was correctly predicted. However, if the goal is to identify students at risk for academic difficulty and/or attrition, they were more difficult to predict due to the low numbers of observed and predicted values for those categories. The analysis proves to be a better predictor for those who are academically successful and/or retained. Although the models provided statistically significant predictive variables, they do not provide the same degree of practical significance for practitioners.

Further discussion of the findings will continue in the next chapter, along with limitations and suggestions for future research.

Table 17

*Summary of Findings*

Number	Null Hypothesis	Finding
1	There will be no statistically significant differences in the prediction of academic success for student-athletes based on the nine factors of the TCI.	Rejected
2	There will be no statistically significant difference in the prediction of academic success for student-athletes based on the TCI Index.	Rejected
3	There will be no statistically significant differences in the prediction of academic success for student-athletes based on demographic, cognitive and non-cognitive variables (nine factors of the TCI).	Rejected
4	There will be no statistically significant differences in the prediction of academic success for student-athletes based on demographic, cognitive and non-cognitive variables (TCI Index).	Rejected
5	There will be no statistically significant differences in the prediction of retention for student-athletes based on the nine factors of the TCI.	Failed to Reject
6	There will be no statistically significant difference in the prediction of retention for student-athletes based on the TCI Index.	Failed to Reject
7	There will be no statistically significant differences in the prediction of retention for student-athletes based on demographic, cognitive and non-cognitive variables (nine factors of the TCI).	Rejected
8	There will be no statistically significant differences in the prediction of retention for student-athletes based on demographic, cognitive and non-cognitive variables (TCI Index).	Rejected

## **CHAPTER V**

### **Introduction**

This chapter will present a summary of the study, along with the findings and conclusions. The section that focuses on implications will provide suggestions for institutions and the NCAA to enhance current support services. Also covered are limitations of the study and recommendations for future research.

### **Summary of Study**

The purpose of this study was to examine the use of non-cognitive, cognitive, and demographic variables as predictors of college success and retention of Division I first year student-athletes. This study utilized the Transition to College Inventory (TCI), which was designed to help improve the predictive ability of cognitive and demographic variables (Pickering & Calliotte, 1996). The study included data collected from student-athletes from 16 different sports, whose first semester of enrollment at a large, public, moderately selective, research extensive, NCAA Division I university was between 2006 and 2011. The revenue producing sports included men's basketball and women's basketball. The remaining sports are considered non-revenue producing, which include baseball, field hockey, men's golf, women's golf, women's lacrosse, men's sailing, women's sailing, men's soccer, women's soccer, men's swimming/diving, women's swimming/diving, men's tennis, women's tennis, and wrestling. International students were excluded from the study since they are not required to complete the TCI, as were students who had any missing data.

## Summary of Findings and Conclusions

### Academic Success

Many studies have been conducted to determine the factors that best predict the academic success of collegiate students. The cognitive factors high school GPA and SAT/ACT scores are the most common variables used to predict academic success. Lower high school GPA and lower test scores lead to lower academic performance in college (Boudreaux, 2004; Lotkowski et al., 2004). Morgan (2005) and Scogin (2007) also found this to be true for student-athlete populations. This study supports the findings of previous studies that found a correlation of HSGPA with academic success in college. In both models (the nine factors of the TCI and the TCI Index), HSGPA was found to be a significant predictor.

However, the findings of this study do not support the inclusion of standardized aptitude test scores as a predictor of academic performance, which was also the result of Maggard's (2007), as well as Sedlacek and Adams-Gaston's (1992) research. Maggard examined the predictor variables for at-risk scholarship football students at the University of Missouri, using high school GPA, ACT scores, and high school rank. He found that ACT scores were not a significant predictor of first-semester GPA. Sedlacek and Adams-Gaston used the Noncognitive Questionnaire (NCQ) and the SAT in their study on predictors of first-semester freshman student-athletes. The results of their study also indicated that the SAT does not correlate with first-semester grades. The results of this study add to the value of these researchers' findings. Further research needs to continue to examine the ability of the SAT/ACT to predict academic performance. If these results are confirmed by additional studies, institutions and the NCAA need to reevaluate the

emphasis currently put on the SAT/ACT as a factor in determining admissions and initial eligibility.

A variety of demographic variables have been reported as predictors of academic success. African-American males from lower socioeconomic backgrounds have been found to have less success at the college level, which indicates that race, gender, and socioeconomic status are important demographic variables in the prediction of academic success (Noble, 2003; Walpole, 2003). Researchers have also found that students who participate in revenue-producing sports are not as prepared academically as non-revenue sport student-athletes and therefore, have lower academic performance in college (Maloney & McCormick, 1993). This study analyzed the predictive ability of these four factors and found that no demographic variables were a significant predictor. The results of this study did not support the utility of race, gender, socioeconomic status, or sport revenue status as predictors of academic success for student athletes.

Other studies indicate non-cognitive factors play an important role in the prediction of academic success, such as self-concept and institutional commitment (Cunningham, 1993; Garrett, 2000). This study used the Transition to College Inventory (TCI) (Pickering et al., 2005) to conduct an analysis of non-cognitive variables. When evaluating the predictive ability of non-cognitive factors alone, three of the nine factors of the TCI were significant: self-confidence, institutional commitment, and independent activity focus. There are many other non-cognitive factors that other studies have found to correlate with academic success, such as community involvement, which was not supported by this study. Other factors found in previous studies (i.e. a strong support person, self-appraisal, leadership experience, motivation, and preference for long term

goals) were not included in this study (Dennis et al., 2005; Dunham, 1973; Sedlacek, 2004; Tracey & Sedlacek, 1985).

Pickering et al. (2005) found the TCI Index to be a predictor of academic success. Their research indicates that the students' responses to 47 items on the inventory can predict the students' success. Cunningham (1993) reported that non-cognitive variables are better predictors of academic performance than cognitive variables; therefore, they can be used to enhance the predictive ability of cognitive variables. The results of this study found the TCI Index was a significant predictor of academic success when it was the only factor analyzed; however it was not significant when combined with cognitive and demographic factors. Athletic academic advisors can use the TCI Index as a tool to provide academic support to its student-athlete population once they are on campus. The advisors can review the students' responses to each of the items that contributed to an elevated TCI Index and provide guidance to hopefully increase the students' success.

The results of this study indicate that a combination of cognitive and non-cognitive factors best predict academic performance for student-athletes. The best model includes high school GPA alone. The use of the TCI Index, self-confidence, institutional commitment, and independent activity focus can be used separately to provide additional predictive information to administrators. Both the TCI Index and independent activity focus are inversely related to academic success, meaning the higher the level the more likely the student will experience academic difficulty. On the other hand, the higher the level of institutional commitment and self-confidence, the more likely the student is to be successful academically.

## **Retention**

In studies related to the persistence of collegiate students, some of the same factors were found to predict retention, including high school GPA, SAT/ACT scores, and the addition of high school rank (Astin, 1975). Bean (1980) determined that institutional commitment, along with academic performance, predicted whether or not students were retained. As with academic performance, race, gender, and socioeconomic status were identified as predictors in the model by Dennis et al. (2005).

In the analysis of cognitive, non-cognitive, and demographic factors, this study does not support most of the previous research. As in the analysis of academic performance, this study included high school GPA, SAT/ACT test scores, race, gender, socioeconomic status, sport revenue status, the nine factors of the TCI, and the TCI Index. However, an analysis of the retention of students from their first year to their second year found first year cumulative GPA to be the only significant factor in the prediction of student-athlete retention. These results indicate an increased need to provide academic support programs to the student-athletes during their first year in order to increase their potential of being retained. This will be discussed further in the next section.

## **Implications**

Student-athletes arrive on campus less prepared, with lower test scores and lower high school GPAs than non-athletes, which leads to lower academic performance in college (Maloney & McCormick, 1993). Many institutions utilize the high school GPA and test scores as the only tools to assess incoming students. As this study indicates, there

is a combination of non-cognitive, cognitive, and demographic factors that predict academic success.

The most significant factor college administrators should review is the students' high school GPAs. Performance in high school has been found to have a considerable impact on performance in college. This seems logical since high school GPA is a culmination of four years of academic performance, which includes a variety of subjects and grading formats (i.e. papers, projects, and tests).

Institutions should adopt the use of non-cognitive inventories when gathering information on prospective and entering student-athletes. This information alone does not provide enough data to predict academic success; however, it can be used to enhance the predictive ability of high school GPA. Students are not one-dimensional; therefore, the use of multiple factors can provide a more useful profile of the students. This study found no correlation between aptitude tests such as the SAT and ACT and academic success.

Institutional commitment is defined by Pickering, et al. (2005) as "the extent to which the student is committed to attending and graduating from this particular institution" (p. 6). As this study found, institutional commitment is a significant predictor of academic success. The first step in improving a student-athlete's intent on attending and graduating from the institution begins with the recruiting process. Students need to be introduced to the many services and resources on campus that contribute to their experience on campus. Once the student is enrolled, coaches and advisors should work with the student-athletes on setting goals, focusing on their aspiration for attaining their degree. Institutions also need to make an increased effort to encourage student-athlete engagement in campus life, which can include social activities and academic



opportunities (e.g., student organizations and research opportunities). The intent is to get students involved in the campus in order to increase their intention to graduate.

Students may lack self-confidence for a variety of reasons. With the use of non-cognitive instruments that provide feedback on students' self-confidence, university personnel can identify students who are lower in this area. Advisors can encourage these students to take advantage of counseling services on campus to help build their self-confidence. Additionally, advisors can focus on a student's strengths when advising them for courses and majors. Improved self-confidence can potentially lead to better academic performance.

Pickering et al. (2005) found that students with higher levels of independent activity focus are more likely to have academic difficulties. They define independent activity focus as the "student's inclination to participate in activities and pastimes that do not involve active interaction with others" (p. 6). Students should be encouraged to work in groups, whether inside the classroom or outside activities. Instructors can provide opportunities for students to interact with each other for group assignments. Students can also be encouraged to form study groups, either by an instructor, an advisor, or a tutoring program. Increased opportunities for students who indicate a high level of independent activity focus to interact with others could potentially decrease their risk for academic difficulty.

Students' first year cumulative GPA was the most significant factor found by this research for predicting student retention. Academic advisors need to monitor the academic progress of student-athletes and refer students to campus resources when necessary. Increased availability and promotion of academic resources, such as tutoring

and mentoring is also strongly advised. Professors should be encouraged to provide more feedback to students early in the semester, so the students can take advantage of the available resources in a timely manner. Early alert programs can provide early feedback to advisors and other administrators; who can then reach out to floundering students to encourage the use of academic support services.

Currently, institutions and the NCAA use high school GPA and SAT/ACT scores to determine admissions and eligibility status. As the results of this study and others demonstrate, standardized test scores are not a useful predictor of academic success or retention. Admissions' departments and the NCAA need to put less emphasis on the test scores, and instead use multiple variables in the decision-making process. A profile should be created for each prospective student that includes cognitive and non-cognitive data.

According to the NCAA, "the central purpose of the academic performance program is to ensure that the Division I membership is dedicated to providing student-athletes with exemplary educational and intercollegiate-athletics experiences in an environment that recognizes and supports the primacy of the academic mission of its member institutions, while enhancing the ability of male and female student-athletes to earn a four-year degree" (2013-2014 NCAA Division I Manual, 2013, p 135). Student-athletes are participating at institutions of all sizes with varying levels of available finances. The NCAA should provide increased financial support to institutions; especially those with limited funds, so athletic departments can provide increased availability of support services.

### **Limitations**

This study only examined first year student-athletes who entered one large, research institution between 2006 and 2011. Participants were only included if they completed the Transition to College Inventory and had SAT/ACT scores in the student information system. The inventory used provides responses that are self-reported, which can have social-desirability bias. There was a disproportionate distribution in race and sport revenue.

### **Future Research**

This study was conducted at one large, research extensive, NCAA Division I institution. The study should be replicated at a variety of types of institutions, such as Division II and III, and a variety of sizes of institutions. It should also be conducted on a larger scale to include multiple institutions. The use of replication studies would determine whether the indicated predictors can be used across all institutions or if they are relevant only to the study institution.

The current study had a limited number of revenue-producing sport participants. Previous researchers have found that students who participate in revenue sports are less likely to be successful in college (Kiger & Lorentzen, 1988; Pascarella & Truchenmiller, 1999). Future studies should include the sport of football to increase the number of revenue sport participants in order to have a more proportionate distribution. Future studies should also span a longer timeframe to increase the numbers included for smaller teams to allow for a more accurate comparison.

Studies conducted by the NCAA found a correlation between the Academic Progress Rate (APR) and the Graduation Success Rate (NCAA, 2007, Defining

Academic Reform). A longitudinal study should analyze the cognitive, non-cognitive, and demographic factors that predict graduation. The resulting data could be compared to the current research to see if the same variables that predict academic success and retention also predict the ultimate goal of graduation.

Researches have determined race and gender are predictors of both academic performance and retention (Dennis et al., 2005; Elmers & Pike, 1997; Leppel, 2002; Noble, 2003). These variables were not found to be significant predictors in the current study; however, the analysis was based on the ability for the variables to predict academic success and retention. An additional study should conduct an analysis of the predictor variables for race and gender separately. This would show any differences in the prediction models between minorities and non-minorities, as well as between males and females.

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APPENDIX A

***2006***

***TRANSITION  
TO  
COLLEGE  
INVENTORY***

**Developed by**  
James A. Calliotte, PhD  
J. Worth Pickering, EdD

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## TRANSITION TO COLLEGE INVENTORY

The *Transition to College Inventory (TCI)* is a **required part of Freshman Assessment** at Old Dominion University. It is also **an advising tool** that your advisor can interpret with you to assist you to be more successful at Old Dominion.

The *TCI* was developed by Dr. James A. Calliotte, Director of Counseling & Advising Services and Dr. J. Worth Pickering, Director of University Assessment. The **purpose** of the *TCI* is to help staff and faculty to better understand the attitudes, characteristics, and behaviors of incoming first year students so that appropriate assistance can be provided to support each student's academic success. The **potential benefit** to you is the identification of attitudes, characteristics, and behaviors that may cause you academic difficulty and that your academic advisor can help you to improve in order to be more successful.

**All information on the *TCI* will be held in the strictest confidence** on secure computers with password protection. **Only data on first year students as a group will be reported.** Your name and University identification number (UIN) are required in order to create a record of your completed assessment. With your permission, your name and UIN will also be combined with other institutional data about you (e.g., high school GPA, SAT / ACT scores) that will assist your academic advisor in interpreting your results. Any immediate questions about the *TCI* can be directed to the person administering the Inventory.

We would strongly **encourage you to release this information to your academic advisor** so that she or he may discuss the results with you and assist you in resolving any potential problems that could interfere with your academic success during your first year.

Please answer all questions from the *TCI* as accurately and as honestly as possible on the separate *TCI* Answer form using a **No. 2 pencil**. In addition, **please indicate on that form whether or not you agree to release your results to your academic advisor for discussion with you.**

By signing on the *TCI* Answer Sheet, you are saying that you have read the information above or had it read to you, and that you agree to release your results to your advisor.

## Deciding to Attend College

The purpose of this section is to determine the reasons you chose to attend college after high school. Using the following scale, please indicate how important each of the following reasons was in your decision to go to college.

A. *Very Important*

B. *Somewhat Important*

C. *Not Important*

1. To be able to get a better job
2. To broaden my perspectives
3. To get away from home
4. To be able to make more money
5. To learn more about things which interest me
6. To attain feelings of accomplishment and self-confidence
7. To develop and use my athletic skills
8. To prepare myself for graduate or professional school
9. To participate in college social life
10. To develop interpersonal skills

Selected items on the Transition to College Inventory were adapted or adopted from the Freshman Survey conducted by the Higher Educational Research Institute at UCLA.  
Used with permission.

**Choosing This College**

In this section we are interested in finding out how and why you chose to attend this particular college. Please rate the degree of importance you would attach to each of the following items according to the following scale.

**A. Very Important**

**B. Somewhat Important**

**C. Not Important**

11. Parents
12. High School counselor or teacher
13. Talking with an admissions representative on campus
14. High school visits by the Admissions Staff
15. This college's students who are friends or acquaintances
16. A faculty member(s) from this college.
17. This college's recruitment publications
18. Open House / campus visitation day
19. This college's good academic reputation
20. I was offered financial aid
21. Cultural diversity
22. This college's good social reputation
23. Availability of my chosen major
24. I was not accepted by my higher choice college(s)
25. This college's attractive location
26. This college's graduates get good jobs
27. Cost of attending this college.
28. Opportunity to work part-time
29. Opportunity to participate in varsity athletics
30. The appearance of the campus
31. Availability of extracurricular activities



**Abilities and Traits**

In this section, we are interested in learning more about how you would rate yourself on various abilities and traits. Please rate yourself on each of the following abilities or traits compared to the average person your age according to the following scale.

**A. Top 10%**      **B. Above Average**      **C. Average**      **D. Below Average**      **E. Lowest 10%**

**Academic Abilities and Traits**

- 51. General academic ability
- 52. Mathematical ability
- 53. Reading comprehension
- 54. Study skills
- 55. Time management skills
- 56. Writing ability
- 57. Computer skills

**Other Abilities and Traits**

- 58. Drive to achieve
- 59. Popularity with the opposite sex
- 60. Leadership ability
- 61. Physical health
- 62. Self confidence
- 63. Interpersonal communication skills

***Attitudes About Being a College Student***

Please rate the extent to which you agree with each of the following statements about being a college student.

- |                                   |                                      |
|-----------------------------------|--------------------------------------|
| <b><u>A.</u> Strongly Agree</b>   | <b><u>D.</u> Slightly Disagree</b>   |
| <b><u>B.</u> Moderately Agree</b> | <b><u>E.</u> Moderately Disagree</b> |
| <b><u>C.</u> Slightly Agree</b>   | <b><u>F.</u> Strongly Disagree</b>   |

64. It is important to me to be a good student
65. I expect to work hard at studying in college
66. I am committed to being an active participant in my college studies
67. I will be proud to do well academically in college
68. I want others to see me as an effective student in college
69. I admire people who are good students
70. I find learning to be fulfilling
71. I will allow sufficient time for studying in college
72. I see myself continuing my education in some way throughout my entire life
73. I feel really motivated to be successful in my college career
74. I don't seem to get going on anything important
75. I don't seem to have the drive to get my work done

In this section, we are interested in your predictions about how successful you will be in your career at this college. Please select the best answer to each question.

**Predictions About Academic Success**

76. Nationally, about 50% of college students typically leave before receiving a degree. If this should happen to you, which of the following do you think would be the MOST LIKELY cause?
  - A.** I am absolutely certain that I will obtain a degree
  - B.** To accept a good job
  - C.** To enter military service
  - D.** It would cost more than my family could afford
  - E.** To get married
  - F.** Disinterested in study
  - G.** Lack of academic ability
  - H.** Inefficient reading or other study skills

77. Please check the one description below that you feel best represents your career plans at this time.

- A. I have NOT made a career choice at this time and do not feel particularly concerned or worried about it.
- B. I have NOT made a career choice and I am concerned about it. I would like to make a decision soon and need some assistance to do so.
- C. I have chosen a career and although I have not investigated it or other career alternatives thoroughly, I think I would like it.
- D. I have investigated a number of careers and have selected one. I know quite a lot about this career including the kinds of training or education required and the outlook for jobs in the future.

**How great are the chances that the following situations will happen to you?**

A. Very Good Chance

B. Some Chance

C. No Chance

- 78. Graduate with honors
- 79. Miss more than one class per week
- 80. Develop a good relationship with at least one faculty member or an advisor
- 81. Earn at least a "B" average
- 82. Study with other students
- 83. Fail one or more courses
- 84. Find my courses boring
- 85. Receive emotional support from my family if I experience problems in college
- 86. Complete a bachelor's degree at this college.
- 87. If needed, seek assistance for personal, career, or academic problems from the appropriate office on campus
- 88. Be placed on academic probation
- 89. Drop out of college temporarily
- 90. Drop out of college permanently
- 91. Transfer to another college at the end of my freshman year
- 92. Transfer to another college sometime in the future
- 93. Return for the fall semester of my sophomore year
- 94. Be satisfied with this college.
- 95. Have serious disagreements with my family regarding my personal, social, academic, or career decisions

## Predictions About Involvement With This College

In this section, we are interested in your estimates about how involved you might be in various activities at this institution in addition to your courses.

A. Never

B. Occasionally

C. Often

D. Very Often

### During your freshman year, how often do you expect to:

96. Use the library as a place to study and do research for your classes?
97. Talk with faculty informally outside of class?
98. Think about course material outside of class and/or discuss it with other students?
99. Participate in cultural events (art, music, theater) on campus?
100. Use the student center as a place to eat and/or socialize with friends?
101. Use campus athletic facilities for individual or group recreational activities?
102. Participate in campus clubs and organizations?
103. Read articles or books or have conversations with others on campus that will help you to learn more about yourself?
104. Make friends with students who are different from you (age, race, culture, etc.)?
105. Have serious discussions with students whose beliefs and opinions are different from yours?
106. Use what you learn in classes in your outside life?
107. Actively participate in your classes?

### **How great are the chances that the following situations will happen to you?**

A. Very Good Chance

B. Some Chance

C. No Chance

108. Work full-time while attending college
109. Work part-time while attending college
110. Do volunteer work
111. Establish some close friendships with students I meet during my freshman year
112. Be elected an officer in an organization
113. Participate in varsity sports
114. Feel overwhelmed occasionally by all I have to do



**Making a College Choice**

115. When it came to choosing among all of the colleges **to which you were accepted**, what choice was this institution?

- A.** First choice
- B.** Second choice
- C.** Third choice
- D.** Lower than third choice

*Please, be sure you have signed the "Consent to Participate" in the designated space on the front of the answer sheet.*

***Thank you for your time and effort in completing the  
Transition to College Inventory***

***Good luck to you during your freshman year!***

## APPENDIX B

***First-Year Biographical Questionnaire 2006-07*****First-Year Student  
Biographical Questionnaire**

**This questionnaire contains 19 questions and should take you about 10 minutes to complete. Please answer ALL questions.**

**Please enter your name.**

**First***{Enter text answer}*

[ ]

**Last***{Enter text answer}*

[ ]

**Please enter your University ID number.***{Enter text answer}*

[ ]

**1. What are your current living arrangements for this semester?***{Choose one}*

- I am living ON-CAMPUS in university housing.
- I am living either alone or with friends (NOT with relatives) LESS THAN 1 MILE FROM CAMPUS
- I am living alone or with friends (NOT with relatives) MORE THAN 1 MILE FROM CAMPUS.
- I am living at HOME WITH MY PARENTS.
- I am living at HOME WITH MY SPOUSE.
- I am living WITH OTHER ADULT RELATIVES.

**2. What size is your home town?***{Choose one}*

- Rural farm
- Small town (10,000 or fewer persons) MORE THAN thirty miles from a city of 100,000 or more people
- Small town (10,000 or fewer persons) LESS THAN thirty miles from a city of 100,000 or more people
- Mid-sized city (10,000 to 100,000 persons)
- Large city (100,000 or more persons)

**3. What is your current marital status?***{Choose one}*

- Single/never married
- Married AND living with spouse
- Separated / divorced / widowed

**4. Are you a parent?***{Choose one}*

- Yes
- No

**5. Do you have any of the following disabilities? (check all that apply)***{Choose all that apply}*

- Hearing impaired or deaf
- Speech
- Orthopedic
- Learning disability
- Health-related
- Partially sighted or blind
- None of the above

**6. How many hours do you plan to work during this semester while attending Old Dominion?***{Choose one}*

- None
- A few hours occasionally but not on a regular basis
- 10 or fewer hours per week
- 11 to 20 hours per week
- 21 to 30 hours per week
- More than 30 hours per week

**7. Is anyone in your family, including yourself, active-duty, retired, ROTC, or National Guard/Reserves military? (check all that apply)***{Choose all that apply}*

- You
- Father
- Mother
- Son or Daughter
- Your spouse
- No one

**7a. Please select if you are.....***{Choose all that apply}*

- Active Duty
- Retired
- National Guard/Reserves
- Enrolled ROTC

**7b. Please select the branch of service.***{Choose all that apply}*

- Army
- Marines
- Navy
- Air Force
- Coast Guard

**7c. Please select if a member of your family is ...***{Choose all that apply}*

- Active Duty
- Retired
- National Guard/Reserves
- Enrolled ROTC

**7d. Please select the branch of service.***{Choose all that apply}*

- Army
- Marines
- Navy
- Air Force
- Coast Guard

**8. Please indicate those who lived with you this past year.***{Choose all that apply}*

- Father
- Mother
- Brother(s) and/ or sister(s)
- Your spouse
- Other adult relative(s)
- Other adults
- Your child(ren)
- No one

**9. Who was/were the Head(s) of Household in your house this past year?***{Choose one}*

- You and your spouse
- Just you
- Just your spouse
- Parent(s) / step-parent(s) / other adult relative(s) / other adult(s)
- No one

**10. What is the highest level of education achieved by your Father (or male adult who contributed the most to your support while you were growing up)? (If no father or male adult was present while you were growing up, please choose "Not Applicable".)**

*{Choose one}*

- Less than 7 years of school
- Completed junior high school (through 9th grade)
- Some high school
- Completed high school
- Postsecondary training other than college or community college
- Some college or community college
- Completed 2-year college degree
- Completed 4-year college degree
- Some graduate or professional school
- Completed a graduate or professional degree
- Not Applicable

**11. What is the highest level of education achieved by your Mother (or female adult who contributed the most to your support while you were growing up)? (If no mother or female adult was present while you were growing up, please choose "Not Applicable".)**

*{Choose one}*

- Less than 7 years of school
- Completed junior high school (through 9th grade)
- Some high school
- Completed high school
- Postsecondary training other than college or community college
- Some college or community college
- Completed 2-year college degree
- Completed 4-year college degree
- Some graduate or professional school
- Completed a graduate or professional degree
- Not Applicable

**12. IF YOU ARE MARRIED, what is the highest level of education achieved by your SPOUSE?**

**(If you are NOT MARRIED, please choose "Not Applicable".)**

*{Choose one}*

- Less than 7 years of school
- Completed junior high school (through 9th grade)
- Some high school
- Completed high school
- Postsecondary training other than college or community college
- Some college or community college
- Completed 2-year college degree
- Completed 4-year college degree

- Some graduate or professional school
- Completed a graduate or professional degree
- Not Applicable

**13. What is the highest level of education YOU have achieved?**

*{Choose one}*

- Less than 7 years of school
- Completed junior high school (through 9th grade)
- Some high school
- Completed high school
- Postsecondary training other than college or community college
- Some college or community college
- Completed 2-year college degree
- Completed 4-year college degree
- Some graduate or professional school
- Completed a graduate or professional degree

**14. To the best of your knowledge, are you the first one in your family (not including brothers or sisters) to attend college?**

*{Choose one}*

- Yes
- No

**15. What is your best estimate of the combined total income of the adult or adults with whom you lived during the past year for the most recent tax year?**

*{Choose one}*

- Less than \$10,000
- \$10,000 to \$14,999
- \$15,000 to \$19,999
- \$20,000 to \$29,999
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$99,999
- Greater than \$100,000

**16. Which category best describes your FATHER'S occupation (or male adult who contributed the most to your support while you were growing up)? (If no father or male adult was present while you were growing up, please choose "Not Applicable".)**

*{Choose one}*

- High level executive (president or vice-president)/ major professional (e.g. physician or lawyer or college professor)/ large business owner
- Business Manager (department manager or director)/ other professional (e.g. accountant or teacher or nurse or engineer)/ medium business owner
- Administrative personnel (staff) / semi-professional (e.g. programmer or photographer or reporter) / small business owner / skilled office worker

- Clerical / sales worker / technician (e.g. jeweler or computer operator or inspector)
- Skilled manual employee (e.g. carpenter or electrician or farmer or police officer)
- Machine operator / semi-skilled employee (e.g. truck driver or longshore worker)/ maintenance or service worker (e.g. janitor or waiter or waitress or mail carrier)
- Homemaker
- Retired or disabled
- Commissioned Officer/Warrant Officer/Non-Commissioned Officer/Enlisted Personnel
- Not Applicable

**17. Which category best describes your MOTHER'S occupation (or female adult who contributed the most to your support while you were growing up)? (If no mother or female adult was present while you were growing up, please choose "Not Applicable".)**

*{Choose one}*

- High level executive (president or vice-president)/ major professional (e.g. physician or lawyer or college professor)/ large business owner
- Business Manager (department manager or director)/ other professional (e.g. accountant or teacher or nurse or engineer)/ medium business owner
- Administrative personnel (staff) / semi-professional (e.g. programmer or photographer or reporter) / small business owner / skilled office worker
- Clerical / sales worker / technician (e.g. jeweler or computer operator or inspector)
- Skilled manual employee (e.g. carpenter or electrician or farmer or police officer)
- Machine operator / semi-skilled employee (e.g. truck driver or longshore worker)/ maintenance or service worker (e.g. janitor or waiter or waitress or mail carrier)
- Homemaker
- Retired or disabled
- Commissioned Officer/Warrant Officer/Non-Commissioned Officer/Enlisted Personnel
- Not Applicable

**16a. Please choose your father's (or male adult who contributed the most to your support while you were growing up) military rank:**

*{Choose one}*

- Commissioned Officer
- Warrant Officer
- Non-Commissioned Officer
- Enlisted Personnel
- Unknown

**16b. Please choose his military ranking (Commissioned Officers):***{Choose one}*

- O-1
- O-2
- O-3
- O-4
- O-5
- O-6
- O-7
- O-8
- O-9
- O-10
- Unknown

**16b. Please choose his military ranking (Warrant Officers):***{Choose one}*

- W-1
- W-2
- W-3
- W-4
- W-5
- Unknown

**16b. Please choose his military ranking (Non-Commissioned Officers):***{Choose one}*

- E-4
- E-5
- E-6
- E-7
- E-8
- E-9
- Unknown

**16b. Please choose his military ranking (Enlisted Personnel):***{Choose one}*

- E-1
- E-2
- E-3
- E-4
- Unknown

**17a. Please choose your mother's (or female adult who contributed the most to your support while you were growing up) military ranking:***{Choose one}*

- Commissioned Officer
- Warrant Officer



- Non-Commissioned Officer
- Enlisted Personnel
- Unknown

**17b. Please choose her military ranking (Commissioned Officers):**

*{Choose one}*

- O-1
- O-2
- O-3
- O-4
- O-5
- O-6
- O-7
- O-8
- O-9
- O-10
- Unknown

**17b. Please choose her military ranking (Warrant Officers):**

*{Choose one}*

- W-1
- W-2
- W-3
- W-4
- W-5
- Unknown

**17b. Please choose her military ranking (Non-Commissioned Officers):**

*{Choose one}*

- E-4
- E-5
- E-6
- E-7
- E-8
- E-9
- Unknown

**17b. Please choose her military ranking (Enlisted Personnel):**

*{Choose one}*

- E-1
- E-2
- E-3
- E-4
- Unknown

**18. IF YOU ARE MARRIED and your spouse was employed this past year, which category**

**best describes YOUR SPOUSE'S occupation?**

**(If you are NOT MARRIED, please choose "Not Applicable.")** *{Choose one}*

- High level executive (president or vice-president)/ major professional (e.g. physician or lawyer or college professor)/ large business owner
- Business Manager (department manager or director)/ other professional (e.g. accountant or teacher or nurse or engineer)/ medium business owner
- Administrative personnel (staff) / semi-professional (e.g. programmer or photographer or reporter) / small business owner / skilled office worker
- Clerical / sales worker / technician (e.g. jeweler or computer operator or inspector)
- Skilled manual employee (e.g. carpenter or electrician or farmer or police officer)
- Machine operator / semi-skilled employee (e.g. truck driver or longshore worker)/ maintenance or service worker (e.g. janitor or waiter or waitress or mail carrier)
- Homemaker
- Retired or disabled
- Commissioned Officer/Warrant Officer/Non-Commissioned Officer/Enlisted Personnel
- Not Applicable

**19. If YOU WERE EMPLOYED 30 or more hours per week this past year, which category**

**best describes YOUR occupation?**

**(If you were NOT employed 30 or more hours per week this past year, please choose "Not Applicable.")**

*{Choose one}*

- High level executive (president or vice-president)/ major professional (e.g. physician or lawyer or college professor)/ large business owner
- Business Manager (department manager or director)/ other professional (e.g. accountant or teacher or nurse or engineer)/ medium business owner
- Administrative personnel (staff) / semi-professional (e.g. programmer or photographer or reporter) / small business owner / skilled office worker
- Clerical / sales worker / technician (e.g. jeweler or computer operator or inspector)
- Skilled manual employee (e.g. carpenter or electrician or farmer or police officer)
- Machine operator / semi-skilled employee (e.g. truck driver or longshore worker)/ maintenance or service worker (e.g. janitor or waiter or waitress or mail carrier)
- Homemaker
- Retired or disabled
- Commissioned Officer/Warrant Officer/Non-Commissioned Officer/Enlisted Personnel

Not Applicable

**18a. Please choose your spouse's military rank:**

*{Choose one}*

- Commissioned Officer
- Warrant Officer
- Non-Commissioned Officer
- Enlisted Personnel
- Unknown

**18b. Please choose their military ranking (Commissioned Officers):** *{Choose one}*

- O-1
- O-2
- O-3
- O-4
- O-5
- O-6
- O-7
- O-8
- O-9
- O-10
- Unknown

**18b. Please choose their military ranking (Warrant Officers):**

*{Choose one}*

- W-1
- W-2
- W-3
- W-4
- W-5
- Unknown

**18b. Please choose their military ranking (Non-Commissioned Officers):**

*{Choose one}*

- E-4
- E-5
- E-6
- E-7
- E-8
- E-9
- Unknown

**18b. Please choose their military ranking (Enlisted Personnel):**

*{Choose one}*

- E-1
- E-2
- E-3
- E-4

Unknown

**19a. Please choose your military ranking:**

*{Choose one}*

- Commissioned Officer
- Warrant Officer
- Non-Commissioned Officer
- Enlisted Personnel
- Unknown

**19b. Please choose your military ranking (Commissioned Officers):** *{Choose one}*

- O-1
- O-2
- O-3
- O-4
- O-5
- O-6
- O-7
- O-8
- O-9
- O-10
- Unknown

**19b. Please choose your military ranking (Warrant Officers):**

*{Choose one}*

- W-1
- W-2
- W-3
- W-4
- W-5
- Unknown

**19b. Please choose your military ranking (Non-Commissioned Officers):**

*{Choose one}*

- E-4
- E-5
- E-6
- E-7
- E-8
- E-9
- Unknown

**19b. Please choose your military ranking (Enlisted Personnel):**

*{Choose one}*

- E-1
- E-2
- E-3
- E-4

( ) Unknown

**Thank You for Completing the  
First-Year Student  
Biographical Questionnaire**

**Please click the "Finish" button below to submit your responses.**